Sri Lanka Tsunami Reconstruction Program (SLTRP)

USAID Contract # 386-C-00-05-00166-00

Environmental Assessment

Puranawella Fishery Harbor

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SLTRPR-006

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In association with EML Consultants, Chemonics International, DEVTECH, FNI, Engineering Consultants Ltd., Lanka Hydraulic Institute, MICD and Uni-Consultancy Service

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Abbreviations

ADB	Asian Development Bank
CBO	Community Based Organization
CCA	Coast Conservation Act
CCD	Coast Conservation Department
CEA	Central Environmental Authority
CFHC	Ceylon Fisheries Harbour Co-operation
DS	Divisional Secretariat
EA	Environmental Assessment
EMAP	Environmental Management Action Plan
EPL	Environmental Protection License
IEE	Initial Environmental Examination
ITI	Industrial Technology Institute
GDP	Gross Domestic Product
GN	Grama Niladhari
GOSL	Government of Sri Lanka
GSMB	Geological Surveys and Mines Bureau
LA	Local Authority
LHI	Lanka Hydraulics Institute
NARA	National Aquatic Resources Research and Development Agency
NGO	Non-Governmental Organization
PS	Pradheshiya Sabha
Reg. 216	22 CFR 216 (Regulation 216)
SLTRP	Sri Lanka Tsunami Reconstruction Project
USAID	United States Agency for International Development
USEPA	United States Environmental Protection Agency

Executive Summary

Project background

The coastal and marine sector of Sri Lanka was one of the worst affected by the tsunami that hit the country's shores in December 2004. The loss of lives and livelihoods took a heavy toll, which is being gradually remedied by the post-tsunami rebuilding efforts of the Sri Lankan government with the assistance of international partners. The USAID-funded Sri Lanka Tsunami Reconstruction Program (SLTRP) is a valuable contribution to the effort of 'post-tsunami rebuilding' in Sri Lanka through its interventions to improve damaged infrastructure in a number of sectors. In the fisheries sector, SLTRP will rehabilitate and improve infrastructure in three fishery harbors, namely Puranawella, Mirissa and Hikkaduwa, which were affected by the tsunami.

Project description

Harbor rehabilitation work proposed in Puranawella consists of: (a) dredging of the harbor basin; (b) repairing damage to the breakwaters; (c) constructing a new quay wall of approximately 100 meters in length; (d) constructing a 100 meter long revetment; and (e) Improvement to water supply and sanitation facilities. The main objective of the proposed work is to enhance the overall productivity and sustainability of the harbor by carrying out urgently needed rehabilitation and improvement work, and thereby enabling greater economic and social opportunities and benefits for users of the Puranawella fishery harbor.

The present document is the Environmental Assessment (EA) for the Puranawella harbor rehabilitation project, which fulfills the environmental requirements of USAID as set out in 22 CFR 216 (Regulation 216). The purpose of the EA is to provide information to decision makers with respect to enhancing the environmental sustainability of the proposed project through the identification and mitigation of possible adverse impacts.

Project alternatives

In the evaluation of alternatives, two options have been considered: (a) proposed project; and (b) no action. Puranawella harbor will benefit greatly from the proposed project, which will address urgently needed rehabilitation and improvement work. Hence, the 'no action' alternative is unacceptable.

Description of the environment

Physical Environment - Puranawella is a coastal fishing village located in the Matara district on the western side of the Dondra headland (the southernmost point in Sri Lanka). It lies at a distance of 165 kilometers from Colombo. The main surface watercourse in the area is the Nilwala Gange which drains out to the sea about five kilometers west of the harbor site. Poor groundwater quality in nearby areas suggests that water quality may be the same in Puranawella.

Two types of water level oscillations are known to occur in the Puranawella sea area; namely, (1) a tide period of approximately twelve hours with a height range of 0.2 to 0.7 meters; and (2) a seiche period of 15 to 20 minutes with a height range up to 0.04 meters. Currents in the Puranawella sea environment tend to be weak and are determined more by wind and waves rather than tides. In the northeast monsoon period the majority of currents fall in the range of 0.015 to 0.06 m/s (directed east to south) while during the southwest monsoon a majority of the currents fall between 0.03 to 0.12 meters (directed southeast to west).

Biological environment – The land side of the project area consists mainly of homestead, urban and rural residential areas. The seaside, especially where the harbor is located, is formerly where a coral reef existed. However, no living coral is found in the area. On the eastern side of the Dondra headland (Puranawella is on the western side) about 1.5 kilometers from the harbor site, a fringing coral reef exists. The coral cover of the reef and the exact status of its health are not known as few studies have been conducted.

Social environment – The fisheries industry plays a vital role in the local economy of the project area as indicated by the high percentage (89%) of families engaged in the sector. Of these, 72% of families are completely dependent on fisheries, while the others have supplementary income from other sources. Thus, the Puranawella harbor plays a dominant role in this fisheries-based local economy. It is the source of multiple livelihood activities that sustain a large network of beneficiaries, both directly and indirectly. The income levels reported indicate that 58% of the fisheries families in the project area earn more than Rs.10,000 a month, which is a moderate income (Source – Socio-economic survey of the present study).

The Puranawella harbor supports three different fishing systems: fishing in shallow sea using small mechanized boats and traditional crafts; fishing using one-day mechanized boats; and fishing using multi-day boats. The multi-day boat owners earn an approximate net income of Rs. 246,000 per month and employ an average of five people in the operation. Small boat owners fishing in shallow seas earn a net average income of about Rs.44,000 per month, involving two people in the operation.

The relatively high returns in the fisheries industry attract people to the trade. Most of the employable male members in fisheries families in Puranawella take to fishing or a related activity. On the contrary, a majority of the women in the area do not get actively involved in fisheries activities and hence the industry tends to be male-dominated.

In Puranawella, education level up to grade six to ten are relatively satisfactory with about 30% reaching this standard (slightly above the average of 28% in the Matara District). However, a high percentage of students drop out after reaching this standard. The number pursuing education beyond Ordinary Level Examination (Grade 10) is rather low (12%).

Consultations held with local stakeholders of the harbor have revealed a number of issues and problems with the functioning of the harbor for which intervention is sought. These issues are largely related to harbor infrastructure, institutional capacity, ancillary facilities, marketing facilities, etc. The following have been raised as primary issues: (a) inadequate depth of the harbor which hinders navigation and limits berthing space for boats (due to tsunami impact as well as pre-tsunami siltation); (b) inadequate jetty facilities; (c) inadequate pier facilities; (d) lack of a boat repair facility; and (e) improper location of the toilet facility.

Anticipated environmental impacts and mitigation measures

The key impacts associated with the construction stage and proposed mitigatory measures are summarized in the table below:

	Activity	Issue	Significance	Mitigatory measures
1	Blasting	Disturbance to bottom sediments	Low	
		Safety	High – moderate	(a) Hire contractor with necessary skills and experience; (b) Workers should be provided with protective gear; (c) General public should be informed well before blasting is carried out and removed from the vicinity.
		Noise	Low	(a) Should be carried out during a fixed time of the day and avoid sensitive times.
		Vibration (controlled blasting)	Low - Moderate	(a) carry out a condition survey of existing structures in the area of influence, (b) monitor damages to structures, (c) control blasting to avoid excessive vibration (d) restore any damages to structures
2	Dredging	Disturbance to bottom sediments and consequent turbidity in water	Low – moderate (impacts will be temporary and localized)	
3	Disposal of dredged material	None, based on CFHC's intent to use dredge spoils as filling material	None	
4	Movement of dredger in the harbor basin	Renders an area of the harbor as non-usable	Low-moderate	(a) Plan work accordingly in order to minimize inconvenience of passage (e.g. avoiding peak hours); (b) consult harbor users on tentative work plan; (c) display construction time table for information of harbor users
		Inconvenience for boat movement	High	
5	Use of equipment and machinery	Deterioration of air quality	Low	
		Noise	Low	
		Vibration	Low	
6	Quarrying	Worker safety, deterioration of air quality, noise, vibration	Identified quarry is an established one operating with GSMB approval and CEA EPL license.	

			Therefore, it can be reasonably assumed that safeguard measures are already in place. Hence, impact is considered low.	
7	Increase in vehicular traffic inside the harbor	Hindrance to harbor operations Risk of accidents	High Moderate - high	(a) Demarcate construction areas, (b) restrict vehicular movement during busy hours of the harbor (c) educate harbor users on planned construction activities and timing of those.

In addition to the above, the harbor reconstruction activities will create short-term employment opportunities for the local people, which is a positive impact.

In terms of the operation stage, the main impacts will be: (a) increase in employment opportunities and income due to better facilities in the harbor; (b) possible escalation of social conflicts between native and migratory fishermen who will be attracted to the Puranawella harbor due to increased capacity; (c) marginalization of small-scale fishermen due to unequal distribution of benefits. An effective social mobilization and empowerment program for the fishermen would help to minimize social tensions and help improve equity in the distribution of benefits, both from the present project as well as other welfare programs. This would be included as a recommendation in the Harbor Master Plan for Puranawella that will be prepared by SLTRP.

1 Introduction

1.1 Project background

The Indian Ocean tsunami, triggered by a massive earthquake off the coastline of Sumatra in December 2004, wreaked havoc in the region, claiming over 200,000 human lives, displacing thousands and destroying valuable property. Twelve coastal districts in Sri Lanka were affected in one of the worst natural disasters in the country's history.

The coastal region of Sri Lanka hosts about 34% of the country's population. The economic and environmental value of this region is reflected in its people's dependence on its rich diversity of coastal habitats, which provide many goods and services. The coast supports numerous industries and livelihoods that sustain the national and local economies. The tsunami devastated coastal livelihoods, hitting hard at the fisheries sector in particular, which is the predominant economic base in coastal Sri Lanka.

Sri Lanka's coastal and marine fisheries sector is of considerable social and economic importance. Accounting for more than 90% of the total fish production in the country, the sector earns billions of rupees through the export of fish and aquatic products (Rs 9.5 billion in 2003). Its contribution to the country's GDP was estimated at 2.6% in 2003. The coastal and marine fisheries sector provides considerable direct and indirect employment and is the principle income generator in the coastal belt. Almost 75% percent of the country's beach areas are used by fishermen and the industry provides 65% of the animal protein consumed in the country (NARA, 2005).

The fisheries sector suffered a severe blow from the tsunami. A high death toll of fishermen was reported. Around 41% of fisher houses were affected and nearly 67% of marine fishing crafts were destroyed or damaged. Loss of employment due to damages to equipment and infrastructure was estimated to be around 24%. Out of the main fisheries infrastructure, nine harbors, 34 anchorages and 200 landing sites were damaged along with associated facilities, causing severe constraints on the fisheries operations in the post-tsunami period. The country's foreign exchange earnings from fish exports have been greatly reduced this past year due to the tsunami (NARA, 2005 and TAFREN, 2005).

Restoration and recovery of the fisheries sector is of utmost economic and social importance to Sri Lanka. In the post-tsunami restoration and recovery efforts, the Government of Sri Lanka (GOSL) has made a commitment to 'building back better' with the funding assistance extended by the international community. The United States Agency for International Development (USAID) is contributing to this effort through its Sri Lanka Tsunami Reconstruction Program (SLTRP), which aims to improve physical infrastructure in a number of sectors, including fisheries. In this sector, the SLTRP will rehabilitate and improve the infrastructure of the fishery harbors of Hikkaduwa, Mirissa and Puranawella, all of which were severely affected by the tsunami. The present document will discuss activities relating to the proposed rehabilitation work in the Puranawella fishery harbor in the southern district of Matara.

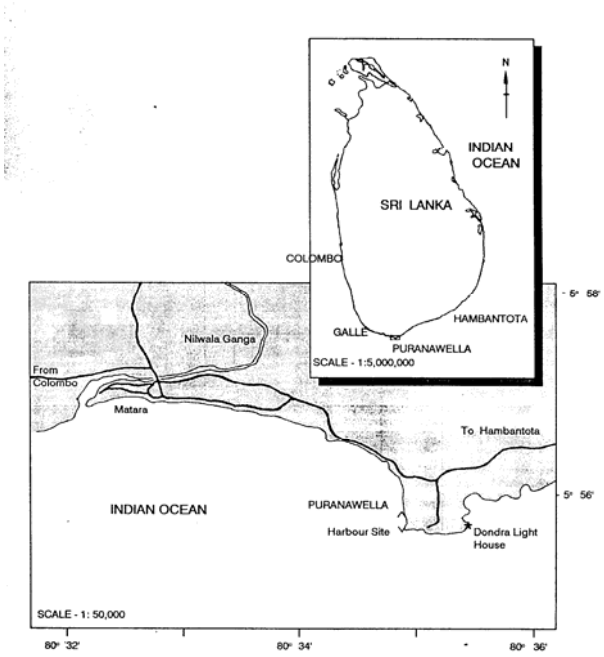

Figure 1 – Location of the Puranawella Harbor

1.2 Project overview and objectives

The Puranawella fishery harbor rehabilitation activity aims at restoring the tsunami damage to harbor structures, improving sustainability and the potential of the harbor facilities. More specifically, the proposed harbor rehabilitation activities in Puranawella will include deepening the harbor basin, rehabilitating the damaged breakwaters, and improving basic onshore facilities, all of which will contribute towards providing improved services – and thus improved economic opportunities – to the users of the harbor. A more detailed description of the project is provided in Chapter 2.

In addition to physical rehabilitation of the harbor, SLTRP will be involved in skills capacity building for improved environmental management through the project's Participatory Coastal Management (PCM) component. Activities to be carried out by the PCM component are being identified in a number of ways, including through community consultations, environmental management needs assessments, and environmental assessments for construction and rehabilitation (including this document), and will include public awareness building, basic skills training, and linkages to SLTRP's vocational education component. As activities are developed to complement the rehabilitation and construction activities described in this document, SLTRP expects to leverage enthusiasm generated by this improved harbor infrastructure to motivate stakeholders to adopt new skills and organizational mechanisms to improve their management of natural resources.

Recommendations developed through such assessments and any other SLTRP documents, including harbor master plans and the fisheries management action plan, will be prioritized and determined to be feasible or not feasible in the Participatory Coastal Management Action Plan (CDAP) to be submitted by SLTRP in April 2006. At that time, any activities that may require further assessment to establish potential environmental impacts will be identified. However, it is anticipated that all PCM activities will fall into the area of capacity building and improved environmental management, which was given a categorical exclusion in the SLTRP IEE (USAID 2005).

1.3 Government Policy

The current GOSL policy for the fisheries sector identifies the need to develop fishery harbors in a planned manner to increase production, namely through offshore fisheries. In terms of the fisheries policy, the harbor rehabilitation project conforms to the requirements of the policy framework and recognizes the principles of long-term sustainability of the fisheries sector.

Specifically, the objectives of the project include:

- Contributing to the government's objective of 'building back better' in the fisheries sector through the provision of improved harbor infrastructure and facilities.
- Encouraging and facilitating the most productive and sustainable usage of the harbor and its facilities for increased fish production.
- Alleviating some of the difficulties faced by fishermen through better planned and improved facilities.

1.4 Purpose of the report

Through various acts and legislation, both the GOSL and USAID have laid down specific procedures to conduct environmental screenings prior to commencing development activities. Relevant aspects of these procedures are summarized below.

In terms of the GOSL regulation, Coast Conservation Act (CCA) provisions apply, as the project falls within the coastal zone regulated by the Coast Conservation Department (CCD). Accordingly, as the project is associated with rehabilitation work only, a full report on environmental impacts is not required. Instead, the CCD will be consulted on a regular basis for their guidance and approval in making environmentally crucial decisions. This process will be described in greater detail in Chapter 5.

In keeping with the USAID regulation on environmental safeguards, which is governed by 22 CFR 216 (Reg. 216), an initial environmental examination (IEE) was prepared for the entire SLTRP, which included the sub-projects on fishery harbors. The IEE was completed prior to the commencement of project implementation. Following the IEE, all key sub-projects of SLTRP received a positive determination and will require separate EAs. A *positive determination* (or positive threshold decision) following an IEE establishes that an action is likely to cause a significant impact or a reasonably foreseeable chance of significant harm to the environment and that preparation of an EA or an environmental impact statement (EIS) will be required.

The present document fulfills the EA requirement for the Puranawella fishery harbor. It contains an analysis of the project's environmental and social impacts, recommending specific measures to implement the project with minimum adverse impacts.

1.5 Definition of project impact area

The region of influence for defining environmental impacts has been defined to include the Puranawella harbor and a surrounding area of one kilometer in radius (both marine and terrestrial). The region of influence for social impacts includes the eight Grama Niladhari (GN) divisions of the Devinuwara DS division that are located around the Puranawella fishery harbor.

1.6 Methodology of the EA

The physical, biological and social environment has been defined by data collected by the methods described below:

- The physical and biological environmental information has been collected from available literature and communication with experts.
- Socio-economic data comes from statistics available at the GN offices, interviews and focus group discussions with relevant stakeholders.
- Consultations with harbor users were carried out to obtain feedback on the proposed project and to gain insight into problems and issues faced in the harbor.

Environmental impacts and mitigation measures are identified based on a scoping session carried out by the authors of this document, with contributions from the team managing the construction planning.

Potential environmental impacts were identified through a discussion among the EA team members (based on past experience of similar projects, expert opinion and field knowledge of the harbor environmental setting). Classification of impacts as 'low', 'moderate' and 'high' has been based on appropriate environmental criteria such as threshold values, standards and expert opinion. Where possible, measures suggested in the EMAP take an approach of adopting necessary safeguards to avoid impacts rather than to mitigate impacts. For example, congestion inside the harbor due to construction vehicles during busy hours, such as the morning auction time, is considered significant by the EA team based on feedback from the harbor users. The EMAP suggests ways and means to avoid this situation through consultative planning of construction work with the harbor users and the harbor management.

2 Project Description

Puranawella Harbor

The major construction activities currently proposed at Puranawella Harbor are as follows:

- Dredging of the harbor basin
- Repairing damage to the breakwaters
- Constructing a new quay wall of approximately 100 meters in length
- Constructing a 100 meter long revetment
- Improvement to water supply and sanitation facilities

2.1 Dredging Work

The total basin area of the harbor is eleven hectares. The bathymetry of the harbor basin and the entrance area are given in Annex 2. The harbor basin criteria are based on a 3.0 meter depth to accommodate multi-day fishing vessels. The corresponding depth of the approach channel must be 4.0 meters. However, the available depths at the harbor entrance and the basin area at present are less than this requirement.

The area to be dredged through SLTRP will be less than the full extent of the harbor basin and will be determined after the review of the anchorage area required for the harbor. It is anticipated that the dredging will be comprised of soft (mainly sand) and rock material.

The seabed in the harbor basin consists of sandstone, which is overlaid by sand in some areas. The sandstone is anticipated to be hard and will require underwater blasting prior to removal. The decision of the type of dredge to be used will be determined by the contractor. However, considering the site conditions, the most likely approach will be to use hopper or garb bucket dredgers to complete the work, both of which can be used for removal of broken rock as well as soft material.

The CFHC has proposed to use the stretch between the small breakwater and the harbor entrance along the beach belt (Annex 2) to dispose of the dredged material. In the future (and not necessary as part of this project) this fill may be used as part of a revetment and/or access road. The formal approval for the proposed disposal location is required from the Director of CCD, for which a proposal will be submitted shortly after completion of this document. As the dredged material is to be disposed of within the harbor and put to some useful application, objection from the CCD is not anticipated. Adherence to conditions imposed by the CCD on the dredged material disposal will be strict.

2.2 Repairs

There are several damaged sections of both long and short breakwaters, and the proposed work will restore the breakwater to its original (as designed) condition. The work includes reconstruction of toe, core and armor layers where necessary. The toe and core material is comprised of rubble ranging from 100 kilograms to one to two ton boulders. The armor layer will consist of boulders from four to eight tons in size. The

rock material is proposed to be brought from an already operating quarry site located at Kekunadura, about eight kilometers from the site. A new concrete pavement will be constructed over the breakwater where appropriate.

2.3 Quay Wall Extension

A new quay wall of approximately 100 meters will be constructed in the harbor. A proposed location of the quay wall parallel to the long breakwater is shown in Annex 2. The type of quay wall (caissons, gabion, concrete blocks, or sheet-pile) will be determined during the detail engineering efforts after the field investigations are completed. The work will include the construction of the quay wall, back filling and compaction, and lying of concrete pavement. The water depth along the quay wall will be 3.0 meters to provide additional berthing facilities for multi-day boats.

2.4 Revetment

A revetment of approximately 100 meters long will be constructed at the location shown in Annex 2. This revetment will be a typical rubble/boulder based coast protection wall of one to two meters in height. The area where the revetment is planned now faces excessive erosional forces due to wave action during the monsoon period.

2.5 Other Minor Improvements

In addition to the above-mentioned key infrastructure rehabilitation and improvements, the project will also enhance basic on shore facilities related to water supply and sanitation. Accordingly, the existing water supply within the harbor and toilet facilities will be improved and a new toilet block for the fisher community will be added.

3 Project Alternatives

The GOSL decided to establish a fishery harbor at Puranawella in the late 1970s due to the pressing demand for such a facility in the area. The planning and development of the harbor was entrusted to the CFHC and work started in early 1980s. As part of the project, suitability of the location and several alternative layouts for the harbor were considered prior to finalization of the present location and arrangement. Due to lack of funds the harbor development was carried out in stages over a period of approximately ten years. A detailed investigation on Puranawella harbor was carried out by the Lanka Hydraulics Institute (LHI) in the early 1990s during its final stages of development.

In the absence of location and major layout alternatives, only two alternatives are considered in this study. These are:

- The proposed project
- No action

The proposed project will rehabilitate and improve Puranawella harbor as it currently exists, which is essentially to enable the efficient and more productive functioning of the harbor. This rehabilitation work is needed due to damage from tsunami. The improvement work, such as dredging, is required to enhance the productivity of the harbor, as its present day usage differs from that originally envisioned in the design process (i.e. increased capacity for multi-day boats). This harbor was originally planned in the 1980s for 3.5 ton crafts, and a corresponding basin depth was established. However, the composition of fishing crafts in the area has changed over time and at present a greater number of multi-day boats over five tons are in operation. The prevailing depth of the harbor basin is insufficient for these crafts, and as a result, only one third of the basin area can be used. Similarly, the quay structures were originally planned for 3.5 ton small crafts. Although the quay structures were later extended to accommodate multi-day boats, the development of the quay facilities is still grossly inadequate to serve the large number larger multi-day crafts (around 300) that currently operate in the harbor. Therefore, expansion of the quay wall and associated facilities are an important and urgent need.

As explained above, it is clear that the proposed project is a positive intervention. It is needed to prevent further deterioration of harbor structures such as breakwaters, and to enhance the productivity and sustainability of the harbor in keeping with the changes that have occurred over time. Without such an intervention (as in the ‘no project alternative’), the conditions of the harbor will deteriorate further and the present facilities will continue to serve the harbor users under-capacity. In the long-term, this situation will adversely affect the growth and expansion of the fisheries sector in Puranawella.

In this light, the proposed project is considered as the preferred alternative and the ‘no project’ alternative is considered unacceptable.

In terms of the proposed quay wall, alternative locations are being evaluated. A possible site for the proposed quay wall is indicated in Annex 2. Final determination of its location will be based on best engineering and social criteria.

4 Description of the existing environment

4.1 Physical environment

4.1.1 Topography and Land Use

Puranawella (Dondra) is a coastal fishing village in the Southern Province of Sri Lanka with a high concentration of fishermen and fishing crafts. Puranawella is located in the Devinuwara Divisional Secretariat (DS) Division of the Matara District, at a distance of 165 kilometers from Colombo on the west side of Dondra Headland, at the southernmost tip of the country (Chandrawansa, 1981; LHI, 1994; Dassanayake et al., 2000; USAID, 2005; Fig. 1). It has a harbor situated in the heart of Puranawella (latitude 5^{o} 56'N and longitude 80^{o} 35' E) (USAID, 2005), which is lined with a beach (Dassanayake et al., 2000).

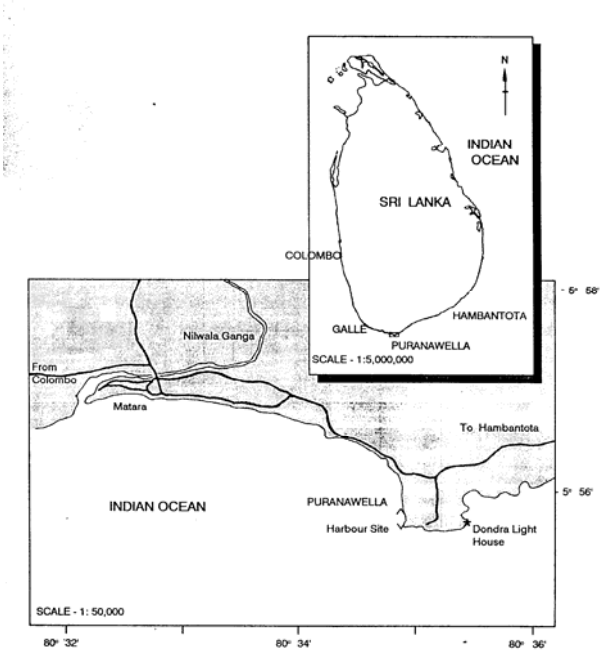

Figure 2 - Location of Puranawella in the Southern Province of Sri Lanka

4.1.2 Hydrology

Rainfall

The project area is in low country wet zone in the Matara District. The annual average rainfall in this area is between 1500 and 2000 millimeters. Much of the rainfall occurs during southwest monsoon, occurring between May and September. The average annual temperature of the entire zone is between 25 and 27.5^{o}C.

Surface Water and Ground Water
The major watercourse in the Puranawella area is the Nilwala Ganga, one of the major rivers in Sri Lanka. Nilwala Ganga is located approximately four kilometers from the project area, and flows out to the sea nearly five kilometers to the west of the harbor (LHI, 1994; USAID, 2005). According to the Post Tsunami Brown Environment Assessment conducted by the University of Moratuwa for the Central Environmental Authority (CEA) of Sri Lanka, Nilwala Ganga is highly polluted with biodegradable organic and fecal matter. This contamination is a consequence of disposal of untreated sewage from commercial, industrial and residential sectors, which is impacted by the high density of slums located in the vicinity of this water body (University of Moratuwa, 2005).

Site specific information on groundwater quality is not available. The closest area to Puranawella where groundwater quality data is available is Matara/Goadagama, which is about ten kilometers from Puranawella and five kilometers inland. The information indicates poor groundwater quality due to acidity, high BOD and fecal contamination. Considering the basic parameters that govern the groundwater quality in the area, similar quality can be expected for Puranawella. Salinity is another parameter that can be high in groundwater in Puranawella due to its proximity to the sea.

Natural Drainage
As indicated by field observations, the harbor and nearby area drain directly into the sea. There are no drainage paths carrying urban runoff entering the harbor from outside. Thus runoff generated within the harbor flow to the harbor basin through the internal drains.

4.1.3 Geology

The broad coastal plain of southwestern Sri Lanka is developed on basement rocks (mainly basic igneous intrusives), on the lower margin of a broad syncline, which tilts downwards to the southwest (ECL, 1997). Soil conditions in the harbor breakwater area have been reported to be medium sand with rock and coral patches (Chandrawansa, 1988). In general, the area allocated for the second breakwater also consists of a sandstone bed. A part of seabed in the harbor basin is exposed sandstone, whereas the other part is covered by sand (loose and compact), mud and clay to depths ranging from 0.2 meters to more than two meters. Scattered rock and outcrops may be found in the harbor basin (LHI, 1994).

4.1.4 Coastal Dynamics

Hydrodynamics
Two types of water level oscillations are known to occur in the Puranawella area according to the studies carried out by LHI (1994).

- Tide period of approximately twelve hours with a height range of 0.2 to 0.7 meters

- Seiche period of 15 to 20 minutes with an amplitude up to 0.04 meters

Seiche is more dominant in the southwest monsoon period than in the northeast monsoon period. However the range of fluctuation of the water level has been recorded to be in the range of two to four centimeters (LHI, 1994).

Eddy formations are known to occur in the vicinity of the harbor basin during both northeast and southwest monsoon seasons. It has been observed that the currents are created mainly by waves and winds rather than by tides. The current speeds calculated by LHI from float tracking in the vicinity of the harbor (at depths less than eight meters) are reported to be generally weak and do not exceed 0.3 m/s during the southwest monsoon period. The current speeds close to the harbor during the northeast monsoon period are comparatively low with values less than 0.15 m/s. The variations of direction of currents are wide, as circulation currents exist close to the harbor entrance (LHI, 1994).

Continuous instrumental current measurements made at depths of nine to twelve meters by LHI also show that currents are weak in the Puranawella sea environment. The speeds are lower during the northeast monsoon period than during the southwest monsoon period. During the northeast monsoon period, currents tend to fall in an east to south direction, and speeds vary from very low values to 0.12 m/s with the majority of the currents falling within the range of 0.015 to 0.06 m/s. The characteristics of the currents differ during the southwest monsoon, where the current directions vary from a southeast to a west direction indicating that they are mainly wave-induced currents. The current speeds vary between 0.015 and 0.30 m/s but the speed of the majority lies between 0.03 and 0.12 m/s (LHI, 1994).

Wind

The Puranawella area experiences two monsoon periods, notably the southwest monsoon, which occurs during the period of April to October, and northeast monsoon, which occurs from November to March. It should be noted that there are no meteorological stations close to Puranawella. However it has been observed that Hambantota wind data is more relevant in Puranawella than Galle since Puranawella is closer to Hambantota. Tables 1 and 2 show the frequency of the occurrence of wind, broken out by direction and speed range respectively, during the period of 1971 to 1979 (end of July) (Chandrawansa, 1981).

	1971	1972	1973	1974	1975	1976	1977	1978	1979
South	-	-	-	-	-	-	-	-	-
South south west	-	-	-	-	-	-	-	-	-
South west	4	5	-	1	4	2	2	29	18
West south west	-	-	4	-	3	4	1	24	11
West	-	-	3	-	-	1	-	1	4
Others	-	-	-	-	-	-	-	10	17
All directions	4	5	7	1	7	7	3	64	40

Table 1 - Frequency of occurrence of winds according to the directions

Speed Range (mph)	1971	1972	1973	1974	1975	1976	1977	1978	Total no. of occurrences over 8 years	Cumulative occurrences over 8 years	Frequency of occurrences Time/yr
25-30	41	30	33	28	29	45	23	53	282	388	48.5
30-35	3	5	9	1	7	7	3	28	63	106	13.3
35-40	1	-	-	-	-	-	-	23	24	43	5.4
40-45	-	-	-	-	-	-	-	10	10	19	2.4
45-50	-	-	-	-	-	-	-	6	6	9	1.1
50-55	-	-	-	-	-	-	-	1	1	3	0.4
55-60	-	-	-	-	-	-	-	-	-	2	0.3
60-65	-	-	-	-	-	-	-	2	2	2	0.3

Table 2 - Frequency of occurrence of winds according to speed

Northeast monsoon winds are normally reduced by the landmass of Sri Lanka, which reduces the height of waves generated in the sea. In contrast, the southwest monsoon winds generate storm conditions in the Puranawella area, resulting in an increase in the height of sea waves (Chandrawansa, 1981).

Bathymetry and Sediment Transport

Four bathymetric surveys were conducted in and around the harbor; three were carried out by NARA in 1988, 1990 and 1991 after the construction of the breakwater, and the other by the CFHC in 1980 before the breakwater construction (NARA, 1991). Then in 1992 the LHI conducted another bathymetric survey (LHI, 1994). NARA has carried out a bathymetric survey of the harbor after the tsunami. This survey was used as the basis of preparing the dredging plan for this harbor.

The 1980 bathymetry revealed that the entire harbor area was more than two meters in depth except in a place where the Holocene sand reef is exposed. In 1988 the entire area was found to be shallower than two meters except in a depression near the head of the breakwater. It was noted that this sand reef was exposed only for six meters with a protrusion of ten meters in 1980, but currently it is found along a 100 meter stretch with a 100 meter protrusion into the sea (NARA, 1991).

The head and the root of the breakwater were silted up by 0.5 meters and one meter, respectively. The 1.5 meter contour of 1980, which was parallel to the shoreline, has moved out diagonally, indicating transport of material towards the root of the breakwater and the sea. The interior of the harbor shows that it has silted by an average of 0.8 meter (NARA, 1991). It is observed that at present, the harbor has silted to a great extent and needs rehabilitation. At present, siltation is not only due to the tsunami but also due to the poor design of the harbor entrance.

Comparison of the results obtained from the bathymetry surveys done in 1988 and 1991 revealed that there is erosion at the northeast side of the harbor and accretion at the southeast corner, thereby indicating that the transportation of material is from the far end

of the harbor to the inner harbor (NARA, 1991). At present, accretion has taken place towards the middle of the harbor, thus reducing the area for harboring vessels.

4.2 Biological environment

The coastal and marine ecological resources along the Sri Lankan coastline are characterized by the presence of sandy beaches, coastal lagoons, and mangroves, as well as marshes and dunes on the landside, and corals, sea grasses and fishing grounds on the seaward side. In terms of habitats and resources in the project area, the land side comprises mainly of homestead and developed areas (urban and residential).

The sea side of the project area, namely the site of the harbor was formerly where a coral reef existed. Lack of data pertaining to the coral reefs of the harbor site makes it difficult to comment on its extent and exact status prior to the harbor construction in the 1970s or afterwards. However, it is the opinion of research experts that no live coral would be found inside the harbor at present and in the immediate vicinity of the harbor. It may be possible that remnant patches with limited coral growth could be occurring outside the harbor in the seaward direction but this is not supported by concrete data.

On the eastern side of the Dondra headland (Puranawella is on the western side of the headland), a fringing coral reef occurs. This is approximately one to 1.5 kilometers distance from the project area. According to expert opinion, there is healthy growth of coral on the reef. The exact extent however is not recorded.

According to the survey conducted by NARA on turtle hatcheries and nesting beaches (Ref Chapter 8), Dondra and Gandara are the two closest points to Puranawella that are visited by turtles. However, the study also notes that these beaches are nested by turtles only occasionally.

4.3 Socio-economic Environment

4.3.1 Demographic condition in the region

The importance of the fisheries sector in the livelihood system and economy of the Devinuwara DS division is best explained by the statistics in Table 3, as well as the graph in Figure 3.

Demographic characteristics (Indicators)	**Indicator values**
Total families in the DS division	10,523
Fisheries families in the DS division	2,976
Percentage of fisheries families of the total families in DS division	28%
Total population in DS division	44,933
Fisheries population in DS division	14,772
Percentage of fisheries population of the total population	32%

Table 3 - Significance of fisheries sector in Devinuwara DS division
Source: Resource profile of Devinuwara DS office (2004)

4.3.2 Demographic condition in project impact area

Eight GN divisions of Devinuwara DS division located around Puranawella fishery harbor have been considered in assessing the impacts of the proposed project. The fisheries industry plays a significant role in the livelihood system/local economy of these eight GN divisions, as the statistics in Table 4 suggest.

Demographic feature (Indicators)	Indicator Values
Total fisheries families in Devinuwara DS division	2,976
Total number of families in the project impact area	2,270
Number of fisheries families living in project impact area	2,020
Percentage of fisheries families of Devinuwara DS division living in project impact area	68%
Percentage of families engaged in fisheries activities in the project impact area	89%
Total fisheries population in Devinuwara DS division	14,772
Fisheries population in project impact area	9350
Percentage of fisheries population in project impact area	62%
Total population in the project area	10,505
Percentage of people engaged in fisheries activities in the project area	89%

Table 4 - Significance of fisheries industry in the project impact area
Note: There is no migrant fisheries population in Puranawella fishery harbor, although migrant vessels sometimes use the harbor facilities. On the contrary, some of the fishermen in Puranawella migrate to other fishery harbors in certain seasons for fishing.

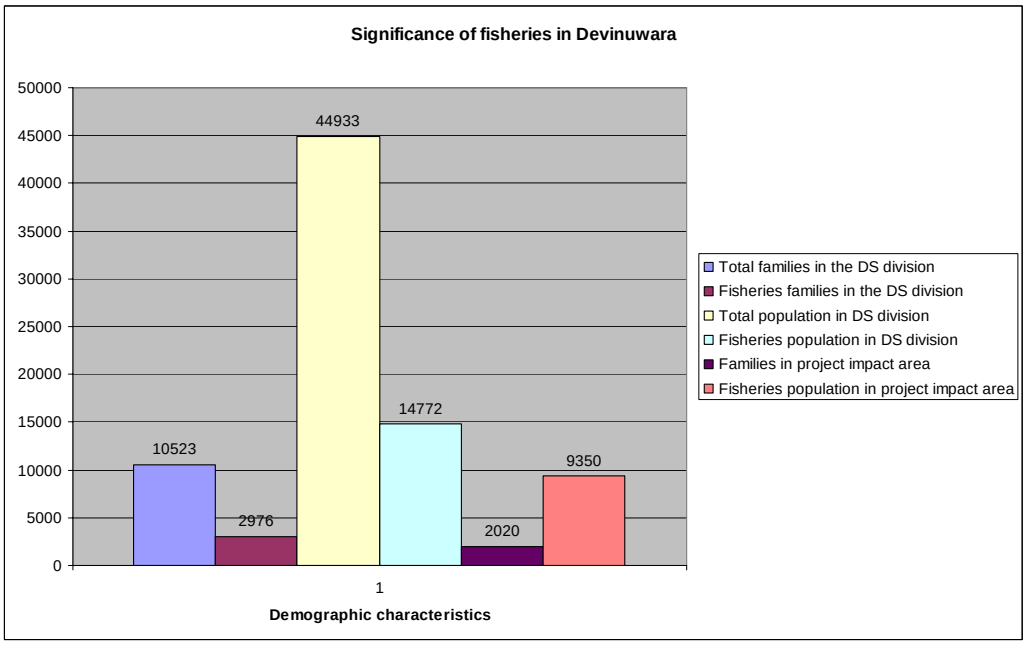

Figure 3 - Significance of fisheries in Devinuwara DS Division and project impact area
Source: Respective GN offices

A population and gender distribution of the eight GN divisions is illustrated in Table 5, specifically depicting the percentage of people engaged in fisheries activities. As indicated in the final column, the majority of people are dependent on the fisheries sector for livelihood needs.

GN division	Population by gender		Total population	Fisheries population by gender		Total fisheries population	% of fisheries population of total population
	Female	Male	-	Female	Male	-	-
Welegoda	651	663	1,314	593	602	1,195	90
Devinuwara-Central	497	485	982	463	452	915	93
Devinuwara-West	338	324	662	291	280	571	86
Devinuwara-North	1,297	1,688	2,985	1141	1485	2,626	88
Gandara watta	598	557	1,155	496	462	958	83
Sinhasana Place	569	443	1,012	530	412	942	93
Predeepagara Place	755	690	14,445	656	601	1,257	87
Devinuwara – East	500	450	950	467	419	886	93
Total	5,205	5,300	10,505	4,637	4713	9,350	89

Table 5 - Population and gender distribution in the project area by GN division
Source: Respective GN offices

4.3.3 Educational level of fisheries population

Educational levels in Puranawella are higher than in remote and isolated fishing communities. A higher percentage attend school – up to about grade six to ten – compared with the general situation in the Matara district. However, there are a high percentage of school dropouts after reaching grade ten, and comparatively (with Matara district) a lesser number pursue education beyond grade ten, as indicated in Table 6.

Education level (Indicator)	Puranawella harbor area (%)	General situation in Matara district (%)
Not attending school	17	7
Not gained formal education	2	6
Grade 1-5	25	23
Grade 6-10	30	28
G.C. E (O/L)	14	20
G.C.E (A/L)	10	12
Other professional/technical education	No	0.3
University education	2	2

Table 6 - Education level among communities in Puranawella fisheries harbor area and other communities in Matara district.
Source: GN offices in Puranawella harbor area and Wilbur Smith Associates/ RDC 2000

Educational statistics among communities in the eight GN divisions are presented in Table 2 in Annex 3.

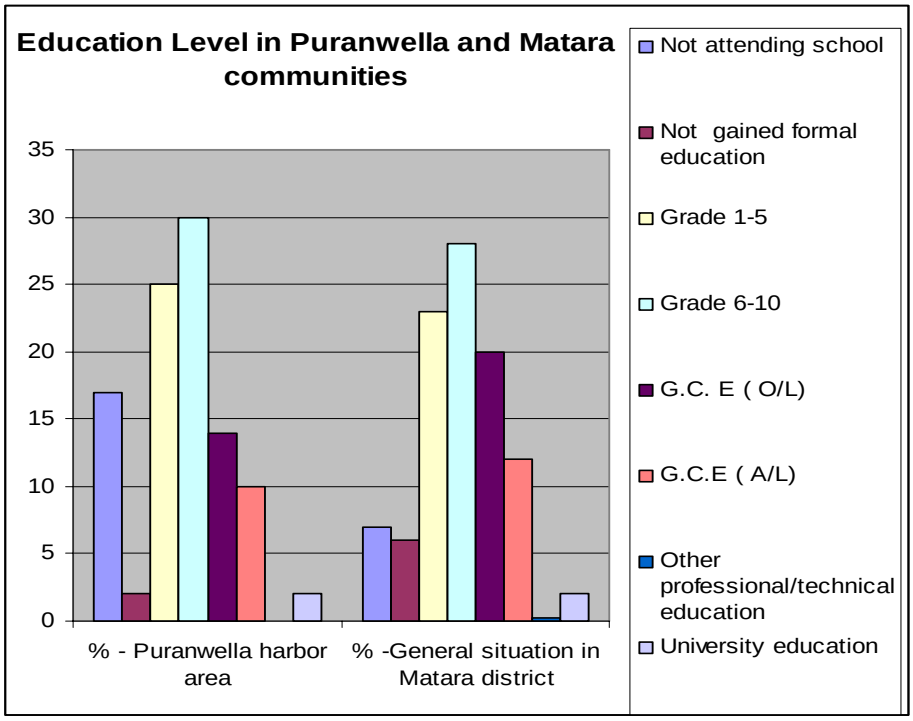

Figure 4 - Education Level among communities in Puranawella and Matara

4.3.4 Livelihoods and income

Livelihoods

In comparison to other livelihood sectors, the fisheries sector shows a clear trend of increasing population involved in the trade. This is mainly because of the high percentage of employable offspring of fishing families choosing the fisheries industry as their livelihood. This is a unique situation to fisheries communities. For example, there are serious problems in the agricultural sector to retain the second generation in agricultural activities. The main reason for this situation is the quick returns experienced in the fishing trade that gives the people a regular daily or weekly disposable income. It was observed that in Puranawella most of the employable male family members of fishing families are engaged in fishing activities. Except in families such as vessel owners, trawler owners and similar groups, rarely do the members of fishing families engage in other jobs. The majority of the people engaged in non-fishery sector employments are from families that do not depend on fishing as the main income source.

The different livelihood sectors in the project area are show below:

- Government employment – 405 persons – (7%)
- Private sector employment – 815 persons (13%)
- Fisheries sector – 4293 persons (71 %)
- Other employment (daily paid labor, self employment, etc.) – 548 persons (9 %)

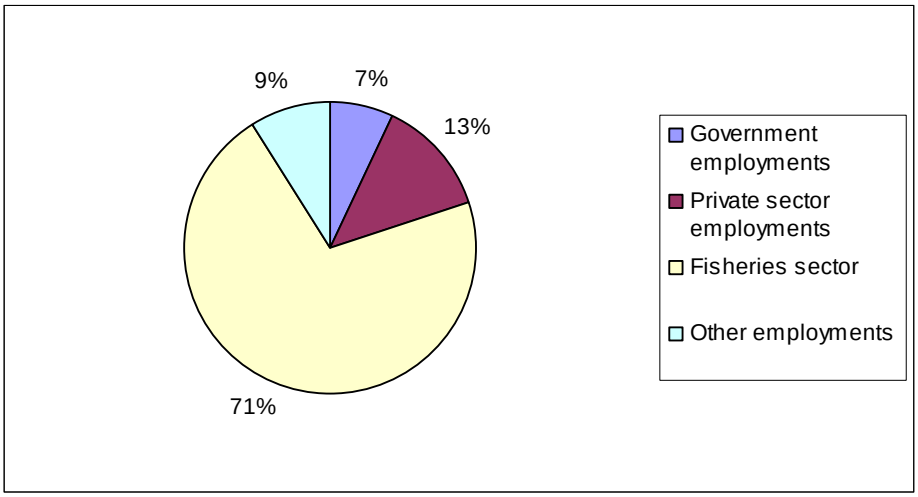

Figure 5 - Distribution of types of employment in project impact area

Multiple livelihood activities of fisheries in Puranawella harbor impact area

The following table demonstrates the type of fishery-related livelihood activities generated by the harbor-based economy. This information has been obtained by group discussions with target communities. It should be noted that there is a discrepancy between the population information given by the target groups and statistical data

collected by the GNs. Nevertheless, the information is presented here to create an understanding of the employment opportunities provided by the harbor and the importance of it in the local economy.

Type of livelihood	Direct		Indirect		Total	
	Number	%	Number	%	Number	%
Boat owners – involved in catching fish	92	4	-	-	92	3
Boat owners – Not involved in catching fish	276	11	-	-	276	10
Helpers of the fishing boats in the sea (Ganiyan in local terminology)	1,735	72	-	-	1,735	63
Fish retailers	50	2	25	8	75	3
Whole sale fish traders	25	1	-	-	25	0.9
Other laborers	50	2	30	9	80	3
Ice producers	2	0.08	-	-	2	0.07
Fishing net repairers	75	3	150	46	225	8
Carpenters repairing boats	25	1	50	15	75	3
Boat mechanics	5	0.2	15	5	20	0.7
Employees of the harbor	40	2	-	-	40	1
Bi-product processors	10	0.4	10	3	20	0.7
Threw jeer drivers	10	0.4	15	5	25	0.9
Lorry owners	-	-	10	3	10	0.3
Food suppliers	10	0.4	20	6	30	1
Total	2,405	100	325	100	2,730	100

Table 7- Multiple fishery related livelihood activities of the project area.

Note: Direct beneficiaries of the harbor are those who are involved in income generation activities directly linked with the harbor. Indirect beneficiaries are those who depend on income generating opportunities created by the direct beneficiaries. For example: (a) fish sellers who depend on buying fish from retailers (without visiting the harbor) who purchase fish directly from the harbor premises; (b) food sellers who serve visitors to the harbor; (c) three wheeler drivers providing transportation to the harbor; and (d) laborers who help in the production of dry fish and other by-products, etc.

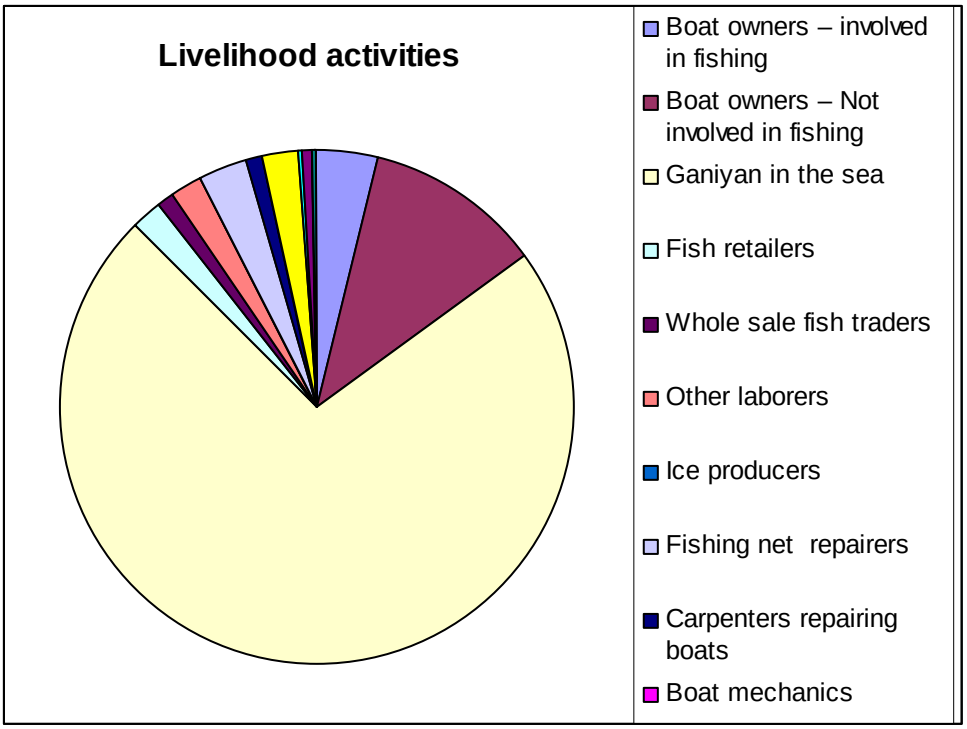

Figure 6 - Livelihood activities of project impact area

Income of fisheries families

Accurate data on income of fishing families is not available and is also difficult to obtain due to reasons such as:

- High fluctuation of income (daily, weekly) due variations in the size of the fish catch.
- Fluctuation of fish prices which are determined by the supply and demand factors.
- Unwillingness of fishermen to reveal their level of income.

In this context, information available with the GNs on the income levels of fishermen may not be entirely accurate, but is indicative of the general nature of livelihood activities and incomes. The income levels reported are as follows.

- Number and percentage of families draw less than Rs 5000/month – 339 (18%)
- Number and percentage of families draw Rs 5000 – 10,000 /month – 503 (23%)
- Number and percentage of families draw Rs 10,000 – 15,000 /month – 652 (27%)
- Number and percentage of families draw Rs 15,000 – 20,000 /month – 432 (18%)
- Number and percentage of families draw more than Rs 20,000/month – 284 (13%)

It is noteworthy that the reported data indicates that nearly 58% of families in the project area earn more than Rs 10,000 a month.

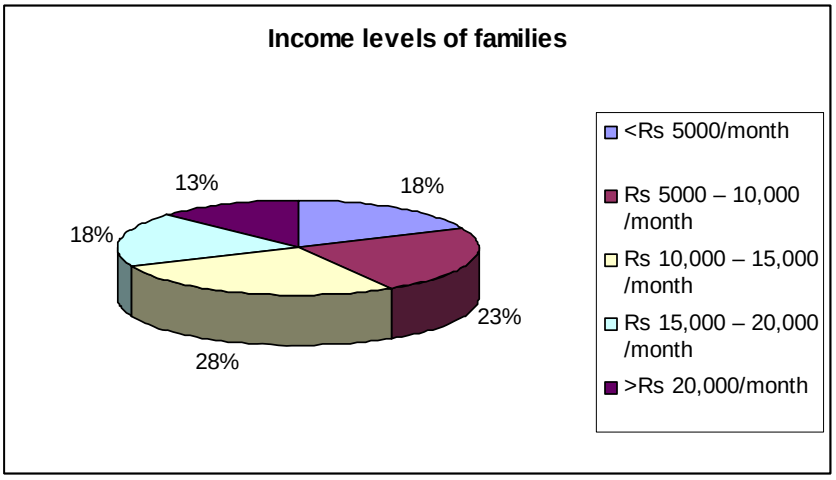

Figure 7 - Distribution of income levels

More details on income levels are contained in Table 4 in Annex 3.

Puranawella harbor supports three types of fishing systems. They are:

Production system 1 – Fishing in shallow sea using canoe, small mechanized boats or traditional wooden boats

Production system 2 – Fishing using one-day mechanized boats.

Production system 3 – Fishing using multi-day boats.

A summary of income and expenditure relating to each system are provided in Table 8, below. The information (basis) used for these calculations is shown in Table 5 in Annex 3.

Activities/ items	Production system-1	Production system-2	Production system-3
Number of persons involved	2	3	5
Catch- Kg/month	1,600	5,000	3,000 raw fish and 4,000 dry fish
Average sale price-Rs/KG	50	65	Rs 80/kg for raw fish and Rs 100/kg for dry fish
Gross income-Rs/month	80,000	325,000	440,000
Cost-Rs/month	36,000	70,000	194,000
Net income – Rs/month	44,000	255,000	246,000

Table 8 – Approximate net income of the three different production systems

Note: The table indicates lower income for multi-day boat operators when compared with one-day boat operators. This is mainly because of the high cost of production involved in the multi-day boat operating system. The one-day boat owners are involved in business almost every other day but their income is highly fluctuating.

4.3.5 Dependence of communities on Puranawella fishery harbor

Prior to the establishment of a formal harbor in 1987 the communities in the local area used the current location of the harbor for sailing traditional fishing vessels. According to accounts of elderly persons in the area, about 125 families used the formally established harbor in 1980s. In later stages, number of families depending on the Puranawella Harbor increased due to:

- The increased capacity of the harbor
- Government efforts to mobilize the growth of the fisheries sector
- Relatively high income that attracted a lot of the young people
- Multiple livelihood activities offered by the harbor

At present the communities in the local area as well as in neighboring areas are heavily dependent on the harbor in Puranawella. The degree of community dependency on harbor is reflected by certain factors observed in the fishing communities in the area:

- High percentage of families (89%) depending on harbor-related income generation.
- Fishing is the main income generation activity. Nearly 72% of fishing families in the area are completely dependent on the harbor. Only 28% of fishing families have some other supplementary source of income. (See Table 6 in Annex 3)
- Large number of modern fishing vessels used in the harbor. About 372 different fishing vessels use the harbor. (Table 7 in Annex 3 includes the types of boats used in the harbor.)
- Possibilities to draw high income from fishing: Rs 44,000/month from small boat, Rs 255,000/month from one-day boat and Rs 246,000/month from multi-day boat. (Details on the income and expenditure are shown in Table 5 in Annex 3)

4.3.6 Involvement of women in fishery activities

The common perception in Puranawella is fishing is a livelihood activity for men and hence the industry is male dominated. The fishermen do not like their women folk to engage in the fishery industry and women are not encouraged to visit the harbor. This situation is different from what can be seen in the Western Province where women are actively involved in fish marketing. However, a small number of women in Puranawella (20) are involved in the making of dry fish in their home gardens for about three months of the year, making an earning of about Rs. 5000 per month. According to information obtained at the focus group discussions, about ten families in project area are women headed families. The male children of these families are involved in fishing activities and therefore, their mothers and other female members are not involved in fishery activities.
Existing institutional network and its performance

There are four types of institutions that are active in the harbor area. They are:

- Government organizations that include mainly CFHC, Fisheries Corporation, NARA, Fisheries Department and government banks. These are entrusted with the tasks of mainly maintenance of harbor and facilities, marketing, research, community welfare and providing credit facilities respectively.
- Private sector organizations involved in providing certain services such as ice, boat repairs, and credit facilities.
- Formal community based organizations (CBOs) such as the fisheries cooperative established with the participation of fishermen. The main role of this CBO is to facilitate the availability of services (credit, welfare, and marketing) from relevant sources to the fishermen. Two other CBOs also have been established with the help of local NGOs (Sanasa and Sarvodaya) to provide credit and welfare facilities to the fishing community, which became more active after the tsunami.
- Informal community organizational structures that consist mainly of accepted norms, procedures, customs that play a decisive role in the functioning of the harbor. For example the large-scale fishermen assume a powerful role in the fishing community and have control over fish prices as well as in the distribution of welfare assistance. The smaller-scale fishermen are basically have little power or authority and are often victims of the informal authority assumed by the richer fishermen. There are also reports of unpleasant activities that take place as a result of this balance of power.

The opinion and experience of fishing communities on the performance of these institutions are shown in Table 9. The opinions expressed below have been obtained through the focus group discussions held with the harbor users.

Institution	**Opinion/experience**
CFHC – harbor management office	The services could be improved and made available for all equally; The maintenance of the harbor premises also is not satisfactory.
Fisheries Corporation	There is no formal arrangement to intervene in fish marketing. Therefore, middlemen exploit the situation and take a larger share of the profit.
NARA	Generally, the communities are satisfied with services of NARA. The research and some training of NARA help the fishermen to locate/identify high fish population spots in the sea.
Government Banks	Most of the fishermen are not entitled for bank loans as they have defaulted on earlier loan schemes.
Private Banks	Access to private banks is difficult for poor fishermen
Fishing vessel repairers	Services are not effective and timely.
Ice producers	Prices are not fair and also quantities supplied are not adequate. Supply on time is also not guaranteed always.
Fisheries cooperative (CBO)	At present it is not effective and the powerful elements exploit the opportunities. As a result the needs of the small scale fishermen are always neglected.

Table 9 - Community opinion and experience on the performance of existing institutions

4.3.7 The cultural aspects of fishing community in Puranawella

The culture prevailing in fishing communities is unique and can be categorized as a sub-culture specific to coastal area of the country. The following cultural features characterize the Puranawella fishing community:

- A low level of education among members of the fishing community is the main reason for many social conflicts. Though the levels of education among community members in eight GN divisions in the project area show some satisfactory conditions, still the education level is low.

- Although Puranawella is not an isolated community, the fishermen and their families lead very different lifestyles. The men are away at sea in the night for periods from one day to 30 days at a stretch, and attend to repairs and maintenance of fishing equipment and vessels during the daytime when on land. There is widespread addiction to alcohol. As a result of these reasons the families don't receive enough attention from the head of the family and children are often neglected.

- Routine money circulation in the community is very high. Fishing leaves a substantial amount of money in the hands of fishermen but there is no culture of saving and spending in a planned way. Spending is mostly unplanned and hence there is no gradual economic upliftment.

- There is also a culture of control over community organizations and welfare assistance in the hands of a powerful few. They bear office titles in these organizations and exploit the opportunities provided by the government to help the poor fishing households. In the absence of a systematic way to mobilize the community, these powerful elements gain access to all benefits and are also recognized as community leaders by service delivery organizations. This is an unwholesome situation for the marginalized sections of the community.

4.3.8 Problems experienced by the local stakeholders in the Puranawella harbor

Institutional/infrastructure problems

The harbor consultations conducted with the community and harbor management by SLTRP team members have brought the following issues to light:

- There exist an inadequate number of laborers to attend to maintenance of harbor premises. The present monthly income of the harbor is about Rs 200,000 to 300,000, which is approximately half of the income needed to carry out satisfactory harbor management. The present tariff structure relates to the size of the boat and has to be paid in the form of a monthly registration fee. Collection of tariff is not smooth due to manipulation by the powerful members of the community.
- The harbor lacks an ice plant. Harbor management seems to be at variance with this requirement wanted by fishermen, as there are perceived to be enough ice producers outside the harbor.
- Inadequate capacity of the fuel station and water taps and will be even more inadequate with the increasing number of boats using the harbor.

- There is a lack of a boat repair shop; however, harbor management does not support the idea of providing such a facility as boat repair services provided are from outside the harbor.
- There is a non-availability of cool house facilities to store fish in the harbor.
- Training for community empowerment and harbor management would be beneficial.
- Accommodation problems exist for migrant fishing vessel and repair laborers.
- Inadequate toilet facilities and lack of ancillary facilities for washing and bathing exists within the harbor. The present toilets are improperly placed and benefits would result if they were relocated.
- There is a lack of a tractor to collect solid waste generated within the harbor, which has polluted the environment inside.
- The access roads to the harbor are in poor condition.
- Regular power cuts occur within the harbor, affecting the functioning of pumps, radio, etc.

Problems with obtaining fishing vessels:

- A long waiting time exists between placing an order for new boats and delivery (e.g. one year).
- The harbor lacks the crane facilities to carry out multi-day boat repairs.
- The fishermen find difficulties in purchasing spare parts for boat engines, fishing nets and other equipment due to high prices maintained by private traders. The fishery management does not have a mechanism to address these types of problems and thereby assist small-scale fishermen.

Problem for anchoring fishing vessels:

- There is a lack of space in the basin to anchor fishing boats.
- The area to anchor boats after fueling is inadequate.
- Shortfalls in security have led to frequent incidents of theft of fishing nets and other equipment.

Marketing problems:

- The Fisheries Cooperation has no established mechanism for fish marketing.
- The capacity of the fish auction hall is not adequate.
- Since there are inadequate facilities to store fish catch overnight, fishermen are compelled to sell the fish to middlemen if the auction is over by the time they arrive.
- There is no mechanism established to process fish when the fishermen cannot sell the whole catch on the same day.
- There is no system prevailing for the local non-fishing communities to buy fish at reasonable prices from the harbor premises.
- Variations in fish prices due lack of proper price controlling mechanisms.

Problems related to facilities in the harbor:

- The capacity of the existing quay wall is not adequate to anchor boats operating in the harbor and to cater to various necessary activities.
- The depth in the larger area of the harbor basin is inadequate for anchoring facilities.
- Existing infrastructure facilities are not properly maintained.
- Waste water and other types of wastes empty into the harbor basin.
- There is no mechanism to ensure for navigational safety at the point of entry to the harbor, which is treacherous due to the presence of rock outcrops.
- The netting hall is not big enough and is not properly protected from rain.

The following were identified by SLTRP staff as the main priorities (in order):

- The need to deepen the harbor basin is critical. An underlying qualification to this request was to make the access to the harbor safer.
- Inadequate jetty facilities exist in the harbor for anchoring and securing the boats and should be remedied. Extension to the existing quay wall facility has been suggested along the breakwaters and/or even in the middle of the harbor as a floating jetty, in a manner that protects boats from damage from crowding and wave action.
- Quay wall facilities need to be extended, specifically to enable unloading and refueling, loading water, supplies, etc.
- Boat repair facilities inside the harbor and the need for crane and slipway facilities.
- The need to relocate the toilet facility. There was a concern that still a handful of fishermen are using the beach for their toilet purposes.

5 Impact Assessment

5.1 Construction related impacts

5.1.1 Deepening the harbor basin (dredging and blasting)

The following table outlines the activities involved in the deepening of the harbor basin and the associated impacts.

	Activity	Sub-activities	Impacts	Significance
1	Rock Blasting	Drilling of rock	Minor disturbance to harbor basin	Low
		Loading explosives	Safety	High
		Blasting	Safety	Moderate
			Some disturbance to basin bed	Low
			Aquatic fauna	Low
			Noise	Low
			Vibration (controlled blasting)	Low-Moderate
2	Dredging	Dredging using hopper type dredger	Disturbance to bottom sediments	Low-Moderate
3	Disposal of dredged material	Loading to barges	None	None
		Disposal at site	Change harbor basin bed formation	Low
4	Movement of dredger and barges carrying dredged material		Dead area within the harbor	Low-Moderate
			Inconvenience for navigation and boat movement	High

Table 10 – Significance of impacts associated with harbor deepening activity

The main issues in terms of rock blasting are occupational safety and vibration. In order to minimize this risk, it is imperative that a contractor with the necessary skills and past experience is employed. The contractor should take every precaution in ensuring the safety of workers and the general public (recommended measures are included in the EMAP).

In order to reduce damage from vibration, the contractor should carry out controlled blasting where physical factors of the sites and proximity to sensitive receptors are taken into consideration to decide on the size of the blast.

Re-suspension of bottom sediments due to blasting and dredging is anticipated to be temporary and localized. Wave studies have shown the current environment in Puranawella to be rather weak. Preliminary investigations in the harbor basin indicate that the soft material of the bottom sediment consists mainly of medium-sized sand. Therefore, it is not anticipated that the re-suspended material will travel a significant distance from the point of origin. Chemical analysis carried out by the University of Moratuwa for the bottom sediments of Hikkaduwa harbor indicates that toxic metals are present in very low quantities and well below the USEPA specified levels. It could be expected that the bottom sediments of Puranawella harbor carry less pollutants than the Hikkaduwa harbor. This is because Hikkaduwa harbor is located in the middle of a busy urban center and receives urban runoff into the harbor basin. Comparatively, Puranawella is situated in a less urban and commercial area and does not receive urban run off from outside. Therefore, it can be safely assumed that the bottom sediments in Puranawella do not carry harmful levels of pollutants that could be re-suspended during dredging.

Disposal of dredged material

Disposal of dredged material is one of the main environmental issues presented by this proposed project. A firm decision regarding the disposal site has not yet been taken. However, there is a proposal by the CFHC to use the dredged material to construct a revetment along the beach (within the harbor) so that the small breakwater can be accessed through the harbor. Three options can be considered in the management of dredged material; a) off-shore disposal in a carefully selected site; b) beach nourishment using dredged sand; (c) use sand and stone as filling material either within the harbor or outside.

The CCD is the approving authority with regard to disposal of the dredged material. The CCD favors useful application of dredged material when compared to offshore disposal. Among the options available is beach nourishment, construction of revetments, etc. In this light, the approach of the CCD is in line with the proposal of the CFHC.

Also, certain sections of the coast north of the Puranawella harbor undergo erosion and would benefit from sand supply. There is also a high demand for dredged sand and stone as filling material. Therefore, the present disposal plan is to dispose of the dredged material between the small breakwater and the main harbor. The proposed disposal area is marked in Annex 2. The CCD approval is expected for this plan and the disposal will be carried out following any guidelines or conditions issued by the CCD.

5.1.2 Impacts on Air Quality

During construction there will be an increase in emission of air pollutants, such as suspended particulate matter (dust and cement) and exhaust emissions from construction vehicles. This however is not a significant impact due to prevailing good wind conditions, and the fact that sensitive receptors are reasonably distant from the construction area and construction activities will not be very extensive. However, safeguard measures are necessary to prevent unwarranted release of dust due to wind

and vehicle movement. These measures are explained in the Environmental Management Action Plan.

5.1.3 Noise Levels and Vibration

The prevailing noise in the harbor is high during busy ours such as mornings hours and evenings. During these hours large number of boats arrives and leaves the harbor daily. The noise generated by these boats is comparable with machinery and equipment that would be used in the construction. Sensitive receptors such as schools, religious places are not located in close proximity to the harbor (within one kilometer). Therefore, the impact of noise from equipment and machinery used in the construction is considered low to moderate. The general safeguard measures mentioned in the EMAP would be adequate for addressing the noise issue due to construction machinery and equipment.

5.1.4 Impacts of waste generation from worker camps

At present, solid waste and wastewater management at this harbor is poor. Solid waste as well as liquid waste is discharged into the harbor basin. As such, significant quantities of floating waste matter can be observed at stagnant corners and along the quay wall. Lack of a waste management system for the worker camps can add to this situation during the construction period and should be avoided at all costs. Worker camps should be provided with bins to collect garbage and regularly emptied at a safe location. Latrines should be properly sited and designed so that pollution of watercourses does not occur.

5.1.5 Impacts from quarrying operations

The rock material for construction will be obtained from an already operating quarry at Kekunadura (Annex 4), which is ten kilometers inland from the harbor location. The quarry already possesses Geological Surveys and Mines Bureau (GSMB) approval and a CEA-issued and current Environmental Protection License (EPL). Therefore it is reasonable to assume that the environmental safeguard measures are already in practice at this quarry. The route from this quarry to the harbor site is already been used for transport of rock material. The impact of use of this road by trucks carrying rock material for harbor work on traffic and road condition is anticipated to be low. It is incorporated into the EMAP that any damage to road, road structures, and side furniture caused by transport vehicles used by the contractor be put right by the contractor.

5.1.6 Employment opportunities

There will be short-term employment opportunities for the local population in the construction phase, which will be a positive impact in the short-term.

5.1.7 Impact on harbor operations

The land base of the harbor is small, and limited free area is available. During the construction there will be frequent movement of heavy trucks carrying construction material. Therefore setting up of storage areas for boulders and other materials will restrict the land space, and movement of trucks could interfere with normal harbor operations. It is important that construction areas be clearly identified and demarcated

(with signposts) with due consideration to harbor operations and for safety concerns. Construction vehicle movements may have to be restricted during morning hours when the harbor is busiest due to fish auctioning. Also a large number of vehicles of fish buyers will come to harbor during this time. It is recommended to identify and demarcate areas for construction activities in consultation with the harbor manager prior to commencement of work. Construction vehicles should be restricted during morning hours (auction time) and this should again be determined in consultation with the harbor manager. The fishermen should be educated about construction activities and appropriate safety measures.

5.2 Anticipated Operation stage impacts

5.2.1 Harbor pollution

At present, waste and wastewater management at this harbor is poor. Solid waste as well as liquid waste is discharged into the harbor basin. Significant quantities of floating waste matter can be observed at stagnant corners and along the quay wall. The project will have minimum to no impact on water quality during operations. However, it is important that harbor management addresses the current problem as a priority. Through the Harbor Master Plans to be prepared under the USAID funded SLTRP, specific recommendations for improved waste management for this harbor will be prepared.

In the meantime, it is recommended that harbor management (CFHC) provide basic infrastructure necessary for waste management, such as waste bins at appropriate places, containers for collection of waste oil, provide wastewater collection system and at least primary treatment such as sedimentation. The CFHC should commence an awareness program among the fisher community on waste management and environmental aspects. The Fishery Harbor Committee can take a lead in carrying out cleaning activities in the harbor. The CFHC should take initiative to get the Harbor Committee involved in such activities. Application of 5S system is useful. The CFHC should provide the members of the committee knowledge on such management approaches on routine basis.

5.2.2 Increase in employment opportunities and income:

The project will allow the harbor to operate at a higher capacity than at present. This will encourage new boats to be added to the existing fleet and create employment opportunities for unemployed members of the community. This will be a positive impact. Improved harbor facilities will also facilitate higher income among the different stakeholders in the harbor community (See Table 11 below).

Stakeholder	Project components	Income increase
Harbor management	Improvements in physical facilities	Higher income from tariffs due to a greater number of boats using the harbor.
Fishermen	Establishment of new quay walls, more space for berthing of vessels.	Increased income for new entrants to the existing fleet.
Service providers	Opportunities to expand services (fuel, ice, cool room, workshop)	Increase in income for new and existing service providers
Local communities	Immigrants to the local area will increase (fish traders, fishing vessel repairers)	Income of shop owners, food suppliers etc may increase moderately

Table 11 - Impact on potential income increases due to project activities

5.2.3 Marginalization of small-scale fishermen

There is a possibility that increased fish production due to increased harbor facilities may lower fish prices. This would marginalize the small-scale fishermen who depend on the sale of smaller quantities of fish. Possible increases in the fleet of small boat owners may lead to lowering of the fish population and result in low catches, which will once again, marginalized the small-scale fishermen. In general, the large-scale fishermen will receive larger share of the benefits.

6 Environmental Management Action Plan

Presented below is the Environmental Management Action Plan (EMAP) for the Puranawella Harbor Rehabilitation Project to be implemented in order to minimize adverse environmental/social impact that would arise out of project activities. The EMAP should form part of the bid documents and shall be considered alongside the specifications. Thereby the prescriptions detailed in the EMAP are mandatory in nature and also will be contractually binding. The EMAP will also be equally applicable to sub-contractors including nominated sub-contractors, if any. The main contractor will be responsible for the compliance with the requirements of the EMAP by sub-contractors including nominated sub-contractors. The "Engineer" on behalf of the Employer will enforce and monitor the compliance of EMAP by the contractor.

Environmental monitoring in construction projects falls into two areas: effect monitoring and compliance monitoring. This section explains the consultants' proposal for environmental monitoring of rehabilitation and improvement works of the Hikkaduwa Harbor.

The EA proved that both long and short term negative effects of this project are mostly negligible. However, the blasting effects on nearby structures, particularly older structures, may be significant if the contractor fails to take control measures. Therefore, it is recommended that blasting impacts be monitored during the construction. If blasting is involved in the harbor dredging, it is recommended that the contractor be asked to submit a program for monitoring the blasting impacts to the engineer for approval. The contractor must submit its plan prior to commencement of blasting work. The contractor's monitoring plan/program shall establish the monitoring parameters, baseline conditions, measurement procedure and frequency of measurements.

The compliance monitoring will enforce the implementation of environmental safeguards as specified in the EMAP. The overall responsibility of enforcement of the compliance of environmental safeguards will rest with the Engineer. However, the effectiveness of compliance regime can be strengthened by participation of other stakeholders, mainly the community in monitoring. Therefore the consultants recommend that an "Environmental Monitoring Committee" be established under the direction of the harbor manager. This committee shall be comprised of the CH2MHill Engineer or site representative, the contractor's senior resident engineer/manager, Local Authority representative, Divisional Secretary and three members from the harbor committee representing the community. The committee should meet regularly to review the effects and compliance with environmental safeguard measures. The committee decisions shall be implemented within the framework provided by the contract agreement and as directed by the Engineer.

Environmental Issues			**Protection And Preventative Measures To Be Taken By The Contractor**	
1.	**Earthwork and Soil Conservation**			
	1.1	**Disposal of Debris and Spoil**		
			(a)	Dredged spoil shall be disposed of only at a location specified by the approving authority (CCD) under recommended guidelines.

Environmental Issues			Protection And Preventative Measures To Be Taken By The Contractor	
			(b)	All other debris and residual spoil material including any left earth shall be disposed only at locations approved by the Engineer for such purpose. If directed by the Engineer the Contractor shall obtain approval from the relevant Local Authority for disposal of debris and spoil at the specified location.
			(c)	The debris and spoil shall be disposed of in such a manner that (i) drainage paths are not blocked (ii) the disposed material will not be washed away by runoff/floods and (iii) will not be a nuisance to the public.
			(d)	If consented to by the Engineer, Contractor can dispose of debris and spoils as a filling material, provided that the Contractor ensures that such material is used for legally acceptable purposes and is disposed of in an environmentally acceptable manner.
	1.2	**Protection of Ground Cover and Vegetation**		
			(a)	Construction vehicles, machinery and equipment shall be used and stationed only in the areas of work and in any other areas designated by the Engineer.
			(b)	Contractor shall provide necessary instructions to drivers and operators not to destroy ground vegetation cover unnecessarily.
	1.3	**Prevention of Soil Erosion**		
			(a)	Work that leads to heavy erosion shall be avoided during the rainy season. If such activities need to be continued during the rainy season prior approval must be obtained from the Engineer by submission of a proposal describing actions to be taken by the Contractor to prevent erosion.
			(b)	The work, permanent or temporary shall consist of measures as per design or as directed by the Engineer to control soil erosion, sedimentation and water pollution to the satisfaction of the Engineer. Typical measures include the use of berms, dikes, sediment basins, fiber mats, mulches, grasses, slope drains and other devices. Construction and maintenance of all sedimentation and pollution control works shall be deemed, as incidental to the earthwork or other work and no separate payment will be made for their implementation.
	1.4	**Contamination of Soil by Fuel and Lubricants**		
			(a)	Vehicles, machinery and equipment used for project purposes shall be used only in designated locations/service stations approved by the Engineer.
			(b)	Waste oil, other petroleum products and untreated wastewater shall not be discharged on ground so that it causes soil pollution. Adequate measures shall be taken against pollution of soil by spillage of petroleum/oil products from storage tanks and containers. All waste petroleum products shall be disposed of in accordance with the guidelines issued by the CEA or the engineer.
			(c)	Sites used for vehicle and plant service and maintenance shall be restored back to their initial status. Site restoration will be considered as implicit to work.
	1.8	**Disposal of Harmful Construction Wastes**		
			(a)	Prior to the commencement of work, the Contractor shall provide to the Engineer a list of harmful, hazardous and risky chemicals/materials that will be used in the project work. The Contractor shall also provide the list of places where such chemicals/materials, their containers or other harmful materials will be dumped as waste at the end of the project.
			(b)	New disposal sites shall not be created as part of this project. Disposal of such waste shall be to the sites designated by the CEA or the Engineer.
			(c)	The contractor shall at their own cost and as directed by the Engineer, clean up any area including water-bodies affected/contaminated (if any) by the project.
	1.9	**Quarry Operations**		
			(a)	Rock quarries from where metal aggregate is obtained shall have approval from the Geological Survey and Mines Bureau as well as the current Environmental Protection License. It is recommended that quarries involved in an ongoing dispute with local communities not be considered as sources.
			(b)	The maintenance and rehabilitation of the access roads in the event of damage by the Contractor's operations shall be a responsibility of the Contractor.
2.	**Water – Protection of Water Sources and Quality**			
	2.1	**Contamination of Water from Construction related wastes**		
			(a)	Dredging should be carried out in such a manner that pollution of harbor basin is minimized (e.g. through the use of non-disruptive dredging techniques, carrying out construction during calm weather.
			(b)	The discharge standards promulgated under the National Environmental Act shall be strictly adhered to. All waste arising from the project is to be disposed of in a manner that is acceptable to the Engineer and as per the guidelines/instructions issued by the CEA.
	2.2	**Contamination from Fuel and Lubricants**		

Environmental Issues			Protection And Preventative Measures To Be Taken By The Contractor	
			(a)	All vehicle and plant maintenance and servicing stations shall be located and operated as per the conditions and/or guidelines issued by the Engineer/CEA. In general these should be located away from the harbor basin and wastewater shall be disposed in accordance with the disposal standards of the CEA. Wastewater from vehicle and plant maintenance and servicing stations shall be removed of oil and grease and other contaminants to meet the relevant standards before being discharged to the environment.
	2.3	**Locating, sanitation and waste disposal in construction camps**		
			(a)	Location of labor camps shall have the Engineer's approval and comply with any guidelines/recommendations issued by the CEA/LA. Construction laborers' camps, **if located outside the harbor** shall not be located within 60m from waterways, near to a site or premises of religious, cultural or archaeological importance, school or any other sensitive area. Labor camps located inside the harbor shall take into consideration harbor operations and ensure minimum congestion.
			(b)	Labor camps shall be provided with adequate and appropriate facilities for disposal of sewerage and solid waste. The sewage systems shall be properly designed, built and operated so that no pollution to ground or adjacent water bodies/watercourses takes place. Garbage bins shall be provided in the camps and regularly emptied. Garbage should be disposed off in a hygienic manner, to the satisfaction of the relevant norms. Compliance with the relevant regulations and guidelines issued by the CEA/LA shall be strictly adhered to.
			(c)	Contractor shall ensure that all camps are kept clean and hygienic. Necessary measures shall be taken to prevent breeding of disease vectors.
			(d)	Contractor shall report any outbreak of infectious disease of importance in a labor camp to the Engineer and the Medical Officer of Health (MOH) or to the Public Health Inspector (PHI) of the area immediately. Contractor shall carry out all instructions issued by the authorities, if any.
			(e)	Contractor shall adhere to the CEA recommendations on disposal of wastewater. Wastewater shall not be discharged to ground or waterways in a manner that will cause unacceptable surface or ground water pollution.
			(f)	All relevant provisions of the Factories Act and any other relevant regulations aimed at safety and health of workers shall be adhered to.
			(g)	Contractor shall remove the labor camps fully after the need is over. Empty septic tanks, if instructed by the engineer, shall be closed, all garbage and debris shall be removed and the area shall be cleaned and restored back to its former condition.
	2.4	**Wastage of Water and Waste Minimization**		
			(a)	The Contractor will minimize wastage of water in the construction process/operations.
			(b)	The Contractor shall educate and make employees aware of water conservation, waste minimization and safe disposal of waste.
	2.12	**Extraction of Water**		
			(a)	The Contractor is responsible for arranging adequate water supply for the project purposes throughout the construction period. Contractor shall not obtain water for his purposes including for labor camps from public or community water supplies without approval from the relevant authority.
			(b)	The Contractor shall not extract water from groundwater or from surface water bodies without permission from the Engineer. If directed by the Engineer, the Contractor must obtain approval from relevant agency for extraction of water prior to the commencement of the project.
			(c)	The Contractor may use the natural sources of water subject to the provision that any claim arising out of conflicts with other users of the said natural sources of water shall be made good entirely by the Contractor.
3.	**Prevention of Water Logging**			
	3.1	**Blockage of drainage paths and drain**		
			(a)	Contractor's activities shall not lead to water logging as a result of blocked drainage paths and drains. The Contractor shall take all measures necessary or as directed by the Engineer to keep all drainage paths and drains clear of blockage at all times.
			(b)	If water logging or stagnation of water is caused by Contractor's activities, Contractors shall provide suitable means to (a) prevent loss of access to any land or property and (b) prevent damage to land and property. Contractor shall compensate for any loss of income or damage as a result.
4.	**Air Pollution**			

Environmental Issues			Protection And Preventative Measures To Be Taken By The Contractor	
	4.1	**Generation of Dust**		
			(a)	The contractor shall effectively manage the dust generating activities such as earthwork during periods of high winds
			(b)	All stockpiles of material generating dust shall be located sufficiently away from sensitive receptors
			(c)	All vehicles delivering materials shall be covered to avoid spillage and dust emission.
			(d)	The Contractor shall avoid, where possible and take suitable action to prevent dirt and mud being carried to the roads (particularly following wet weather);
			(e)	The Contractor shall enforce vehicle speed limits to minimize dust generation;
			(f)	The Contractor shall spray water for dust suppression on all exposed areas as required (note: the use of waste water / waste oil for dust suppression is prohibited);
			(g)	All cleared areas shall be rehabilitated progressively;
			(h)	All earthwork shall be protected to minimize generation of dust;
			(i)	All existing highways and roads used by vehicles of the contractor, any of his sub-contractors, or suppliers of materials; and similarly roads which are part of the works shall be kept clean and clear of all dust/mud or other extraneous materials dropped by such vehicles or their tires.
			(j)	Clearance shall be affected immediately by manual sweeping and removal of debris, or, if so directed by the Engineer, by mechanical sweeping and clearing equipment, and all dust, mud and other debris shall be removed satisfactorily. Additionally, if so directed by the Engineer, the paved areas/road surfaces shall be hosed or watered using appropriate equipments.
			(k)	Plants, machinery and equipment shall be so handled (including dismantling) so as to minimize generation of dust.
			(l)	The Contractor shall take precaution to reduce the level of dust emission from the batching plants up to the satisfaction of the Engineer in accordance with the relevant emission norms.
	4.2	**Emission from Batching Plants**		
			(a)	The batching plants shall be sited in accordance with Engineer's guidelines. It is recommended that batching plants be located sufficiently away from sensitive sites, if located outside the harbor. Sensitive sites include vulnerable habitats, religious, cultural and archaeological sites, residential areas, schools and industrial areas.
	4.3	**Odor and offensive smells**		
			(a)	Contractor shall take all precautions to prevent odor and offensive smell emanating from chemicals and processes applied in construction works or from labor camps. In a situation when/where odor or offensive smell does occur Contractor shall take immediate action to rectify the situation. Contractor is responsible for any compensation involved with any health issue arisen out of bad odor and offensive smells.
			(b)	The waste disposal and sewerage treatment system for the labor camps shall be properly designed, built and operated so that no odor is generated. Compliance with the regulations on health and safety as well as CEA guidelines if any shall be strictly adhered to.
	4.4	**Emission from Construction Vehicles, Equipment and machinery**		
			(a)	The emission standards promulgated under the National Environment Act shall be strictly adhered to.
			(b)	All vehicles, equipment and machinery used for construction shall be regularly serviced and well maintained to ensure that emission levels comply with the relevant standards.
5.	**Noise Pollution and Vibration**			
	5.1	**Noise from Vehicles, Plants and Equipment.**		
			(a)	All machinery and equipment should be well maintained and fitted with noise reduction devices in accordance with manufacturer's instructions.
			(b)	All vehicles and equipment used in construction shall be fitted with exhaust silencers. During routine servicing operations, the effectiveness of exhaust silencers shall be checked and if found to be defective shall be replaced. Notwithstanding any other conditions of contract, noise level from any item of plant(s) must comply with the relevant legislation for levels of sound emission. Non-compliant plant shall be removed from site.

Environmental Issues			Protection And Preventative Measures To Be Taken By The Contractor	
			(c)	Noise limits for construction equipment used in this project (measured at one meter from the edge of the equipment in free field) such as compactors, rollers, front loaders, concrete mixers, cranes (moveable), vibrators and saws shall not exceed 75 dB(A).
			(d)	Maintenance of vehicles, equipment and machinery shall be regular and proper, to the satisfaction of the Engineer, to keep noise from these at a minimum.
			(e)	Workers in vicinity of loud noise, and workers working with or in crushing, compaction, batching or concrete mixing operations shall be provided with protective gear.
	5.2	**Vibration**		
			(a)	Contractor shall take appropriate action to ensure that construction work does not result in damage to adjacent properties due to vibration.
			(b)	Prior to commencement of any activity that generates vibration (such as blasting), the Contractor shall undertake a condition survey of existing structures within the zone of influence, as agreed with the engineer.
			(c)	Contractor shall carry out monitoring at the nearest vibration sensitive receptor during blasting or when other equipments causing vibration are used.
			(d)	The Contractor shall modify the method of construction until in compliance with the criteria, if vibration levels exceed the relevant vibration criteria.
			(f)	Contractor shall pay due consideration to vibration impacts of blasting on adjoining structures. Explosive loads shall be determined so that excessive vibration can be avoided and blasts shall be controlled blasting in nature. Notwithstanding to these provisions Contractor is liable for any damage caused by blasting work.
	5.2	**Noise from Blasting or Pre splitting Operations.**		
			(a)	Blasting shall be carried out only with permission of the Engineer. All the statutory laws, regulations, rules, etc., pertaining to acquisition, transport, storage, handling and use of explosives shall be strictly followed.
			(b)	Blasting shall be carried out during fixed hours, as permitted by the Engineer. The timing should be made known to all the people within 200m from the blasting site in all directions. People, except those who actually light the fuse shall be excluded from the area of 200m from the blasting site in all directions at least 10 minutes before the blasting. Lowering of 200m-influence area is acceptable if approved by the Engineer.
6.	**Impact on Flora**			
	6.1	**Loss or Damage to Trees and Vegetation**		
			(a)	All works shall be carried out in a manner that the destruction to the flora and their habitats is minimized. Trees and vegetation shall be felled / removed only if they impinge directly on the permanent works or necessary temporary works. In all such cases Contractor shall take prior approval from the Engineer.
			(b)	Contractor shall make every effort to avoid removal and/or destruction of trees of religious, cultural and aesthetic significance. If such action is unavoidable the Engineer shall be informed in advance and shall carry out public consultation and report on the same should be submitted to the Engineer.
			(c)	Contractor shall adhere to the guidelines and recommendations made by the Central Environmental Authority, if any, with regard to felling of trees and removal of vegetation.
7.	**Impact on Fauna**			
	7.1	**Loss, Damage or Disruption to Fauna**		
			(a)	All works shall be carried out in such a manner that the destruction or disruption to fauna and their habitats is minimal.
			(b)	Construction workers shall be instructed to protect fauna and aquatic life as well as their habitats. Hunting, poaching and unauthorized fishing by project workers is not allowed.
8.	**Disruption to Users**			
	8.1	**Loss of Access**		
			(a)	At all times possible, work in the harbor basin and shore areas shall be planned and carried out in a way that will minimize obstruction to the activities of fishermen (vessel movement, loading, unloading, fuelling, auctioning, boat repairing etc). The Contractor shall, in close consultation with the representatives of the fishing community, develop a time chart of construction work and display it for purpose of public information.
			(b)	At all times, the Contractor shall provide safe and convenient passage for vehicles and pedestrians inside the harbor, livestock to and from side roads and property accesses connecting the access road. Contractor will demarcate construction areas in consultation with the harbor management and minimize vehicular traffic during the busy hours of the harbor. Work that affects the use of access roads and existing accesses shall not be undertaken without providing adequate provisions to the prior satisfaction of the Engineer.

Environmental Issues			Protection And Preventative Measures To Be Taken By The Contractor	
			(b)	The works shall not interfere unnecessarily or improperly with the convenience of public by use and occupation of public or private roads, railways and any other access footpaths to or of properties whether public or private.
			(c)	On completion of the works, all temporary obstructions to access shall be cleared away, all rubbish and piles of debris that obstruct access be cleared to the satisfaction of the Engineer.
	8.2	**Traffic Jams and Congestion**		
			(a)	Contractor shall assess the impact of his activities on traffic in access roads. A plan for minimizing traffic-related inconvenience to public shall be submitted to the Engineer for approval. If directed by the Engineer the Contractor shall obtain the consent for the traffic arrangement from the Local Police.
			(b)	Any temporary diversion of traffic to facilitate construction work shall have the approval of the Engineer. If directed by the Engineer the Contractor shall obtain the consent for the traffic arrangement from the Local Police.
			(d)	The Contractor shall ensure that the running surface is always property maintained, particularly during the monsoon so that no disruption to the traffic flow occurs.
			(e)	The temporary traffic detours shall be kept free of dust by frequent application of water, if necessary.
			(f)	Personnel used for traffic control by the Contractor shall be properly trained, provided with proper gear including communication equipment, luminous jackets for night use. All signs, barricades, and pavement markings used for traffic management should be to the standards and approved by the Engineer/ Police.
	8.3	**Traffic Control and Safety**		
			(a)	The Contractor shall take all necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades, including signs, markings, flags, lights and flagmen as may be required by the Engineer for the information and protection of traffic using the access roads.
9.	**Accidents and Risks**			
	9.1	**Public and Worker safety**		
			(a)	All reasonable precautions will be taken to prevent danger of the workers and the public from accidents such as fire, explosions, blasts, falling rocks, falling to excavated pits, breaking flood diversions, chemical sprays, unsafe power supply lines, etc.
			(b)	The Contractor shall comply with requirements for the safety of the workmen as per the International Labor Organization (ILO) convention No. 62 and Safety and Heath regulations of the Factory Ordinance of Sri Lanka to the extent that those are applicable to this contract. The Contractor shall supply all necessary safety appliances such as safety goggles, helmets, masks, boots, etc., to the workers and staff.
	9.2	Prevention of Risks of Electrocution		
			(a)	All electrical wiring and supply related work should confirm to relevant Sri Lankan standards. Adequate precautions will be taken to prevent danger of electrocution from electrical equipment and power supply lines including distribution boards, transformers, etc. Measures such as danger signboards, danger/red lights, fencing and lights will be provided to protect the public and workers. All electric power driven machines to be used in the construction shall be free from defect, be properly maintained and kept in good working order, be regularly inspected to the satisfaction of the Engineer.
	9.3	**Risk at Hazardous Activity**		
			(a)	All workers employed in hazardous activities shall be provided with necessary protective gear. These activities include mixing asphalt material, cement, lime mortars, concrete etc., welding work, work at crushing plants, blasting work, operators of machinery and equipment such as power saws, etc.
			(b)	The use of any toxic chemical shall be strictly in accordance with the manufacturer's instructions. The Engineer shall be notified of toxic chemicals that are planed to be used in all contract related activities. A register of all toxic chemicals delivered to the site shall be kept and maintained up to date by the Contractor. The register shall include the trade name, physical properties and characteristics, chemical ingredients, health and safety hazard information, safe handling and storage procedures, and emergency and first aid procedures for the product.
	9.5	**Handling of Explosives**		
			(a)	Except as provided in the contract or ordered or authorized by the Engineer, the Contractor shall not use explosives. Where the use of explosives is so provided or ordered or authorized, the Contractor shall comply with the requirements of the following Sub-Clauses of this Clause besides the law of the land as applicable.

Environmental Issues			Protection And Preventative Measures To Be Taken By The Contractor	
			(b)	The Contractor shall at all times take every possible precaution and shall comply with relevant laws and regulations relating to the importation, handling, transportation, storage and use of explosives. Contractor shall obtain Defense Ministry approval for importing and handling explosives and keep the Local Police informed of the same.
			(c)	Contractor shall take precaution to prevent injury to people and damage the structures/houses and vehicles in the vicinity at the locations of blasting work. Blasting should be controlled to prevent vibration damage to structures and injury to people. The vehicles should be stopped at a reasonable distance from the site and people in the vicinity should be informed when the blasting is carried out. Blasting work should not be carried out during the hours of darkness or at other times that may cause unacceptable disturbance to operation of the harbor.
			(d)	Sufficient and adequate warning shall be given prior to blasting. Use of flagmen, siren, etc. should be arranged to the full satisfaction of the Engineer. The public in the area should be informed well in advance about the blasting operation and timing.
10.	**Health and Safety**			
	10.1	**Prevention of Vector based Diseases**		
			(a)	Contractor shall take necessary actions to prevent breeding of mosquitoes at places of work, labor camps, plus office and store buildings. Stagnation of water in all areas including gutters, used and empty cans, containers, tires, etc. shall be prevented. Approved chemicals to destroy mosquitoes and larvae should be regularly applied.
			(b)	Contractor shall keep all places of work, labor camps, plus office and store buildings clean devoid of garbage to prevent breeding of rats and other vectors such as flies.
	10.2	**Workers Health and Safety**		
			(a)	Contractor shall comply with the provisions in Health and Safety regulations under the Factory Ordinance with regard to provision of health and safety measures and amenities at work place(s).
	10.2	**First Aid**		
			(a)	At every workplace, first aid kit shall be provided as per the regulations. At every workplace an ambulance room containing the prescribed equipment and nursing staff shall be provided.
	10.3	**Potable Water**		
			(a)	In every workplace and labor camps portable water shall be available through out the day in sufficient quantities. Water should be easily accessible. In general cold portable water is acceptable.
	10.4	**Hygiene**		
			(a)	The Contractor shall provide and maintain necessary (temporary) living accommodation and ancillary facilities for labor to standards and scale approved by the resident engineer.
			(b)	At every workplace and labor camps sufficient number of bathing facilities, latrines and urinals shall be provided in accordance with the Health and Safety regulations and/or as directed by the Engineer. These bathroom and toilet facilities shall be suitably located within the workplace/buildings. Latrines shall be cleaned at least three times daily in the morning, midday and evening and kept in a strict sanitary condition. If women are employed, separate latrines and urinals, screened from those for men and marked in the vernacular shall be provided. There shall be adequate supply of water, within and close to latrines and urinals.
			(c)	The sewage system for the camp must be properly designed, built and operated so that no health hazard occurs and no pollution to the air, ground or adjacent watercourses takes place. Compliance with the relevant legislation must be strictly adhered to
			(d)	Garbage bins must be provided in the camp and regularly emptied and the garbage disposed off in a hygienic manner. Construction camps shall have a clean hygienic environment and adequate health care shall be provided for the work force.
			(d)	Unless otherwise arranged for by the Local Authority, the Contractor shall arrange proper disposal of sludge from septic tanks. The Contractor shall obtain approval for such disposal from the Public Health Inspector of the area.
11	**Protection of Archaeological, Cultural and Religious Places and Properties**			
	11.1	**Chance found Archaeological property**		
			(a)	All fossils, coins, articles of value of antiquity and structures and other remains or things of geological or archaeological interest etc. discovered on the site and/or during construction work shall be the property of the Government of Sri Lanka, and shall be dealt with as per provisions of the relevant legislation.

Environmental Issues			Protection And Preventative Measures To Be Taken By The Contractor	
			(b)	The Contractor shall take reasonable precaution to prevent his workmen or any other persons from removing and damaging any such article or thing and shall, immediately upon discovery thereof and before removal acquaint the Engineer of such discovery and carry out the Engineer's instructions for dealing with the same, awaiting which all work shall be stopped in the respective area.
			(c)	If directed by the Engineers the Contractor shall obtain advice and assistance from the Department of Archaeology of Sri Lanka on conservation measures to be taken with regard to the artifacts prior to recommencement of work in the area.
12	**Environmental Enhancement**			
		Handling Environmental Issues during Construction		
			(a)	The Contractor will appoint a suitably qualified Environmental Officer following the award of the contract. The Environmental Officer will be the primary point of contact for assistance with all environmental issues during the pre-construction and construction phases. He/She shall be responsible for ensuring the implementation of the EMAP.
			(b)	The Contractor shall appoint a person responsible for community liaison and to handle public complains regarding environmental/social related matters. All public complaints will be entered into the Complaints Register. The Environmental Officer will promptly investigate and review environmental complaints and implement the appropriate corrective actions to arrest or mitigate the cause of the complaints. A register of all complaints is to be passed to the Engineer within 24 hrs they are received, with the action taken by the Environmental Officer on complains thereof.
			(c)	Contractor shall develop a suitable method to receive complaints. The complaint register shall be placed at a convenient place, easily accessible by the public.
			(d)	The Contractor shall be responsible in reporting the implementation of the EMAP to the employer based on an agreed reporting format either monthly or periodically, as agreeable. The report should carry observations of the 'Engineer' who will be monitoring compliance with EMAP continuously. Periodic field supervision shall be undertaken by the employer (or representatives) to make observations on the implementation progress of the EMAP.

7 Conclusions

The findings of the EA clearly indicate that potential adverse environmental and social consequences arising out of project activities on the surrounding environment are of minor to moderate significance and mitigatable, provided that the recommended measures in the EMAP are properly implemented. In addition, from an economic and social point of view, the proposed project will be a boost to the local economy and provide stimulus for the growth of the fisheries sector. The harbor rehabilitation activities have been long awaited by its users and will greatly help overcome some of the operational and functional difficulties faced at present.

Therefore, it is concluded that the proposed rehabilitation work in Puranawella harbor will provide an overall benefit to the community and environment as long as precautionary measures are adopted to minimize the potential adverse impacts identified.

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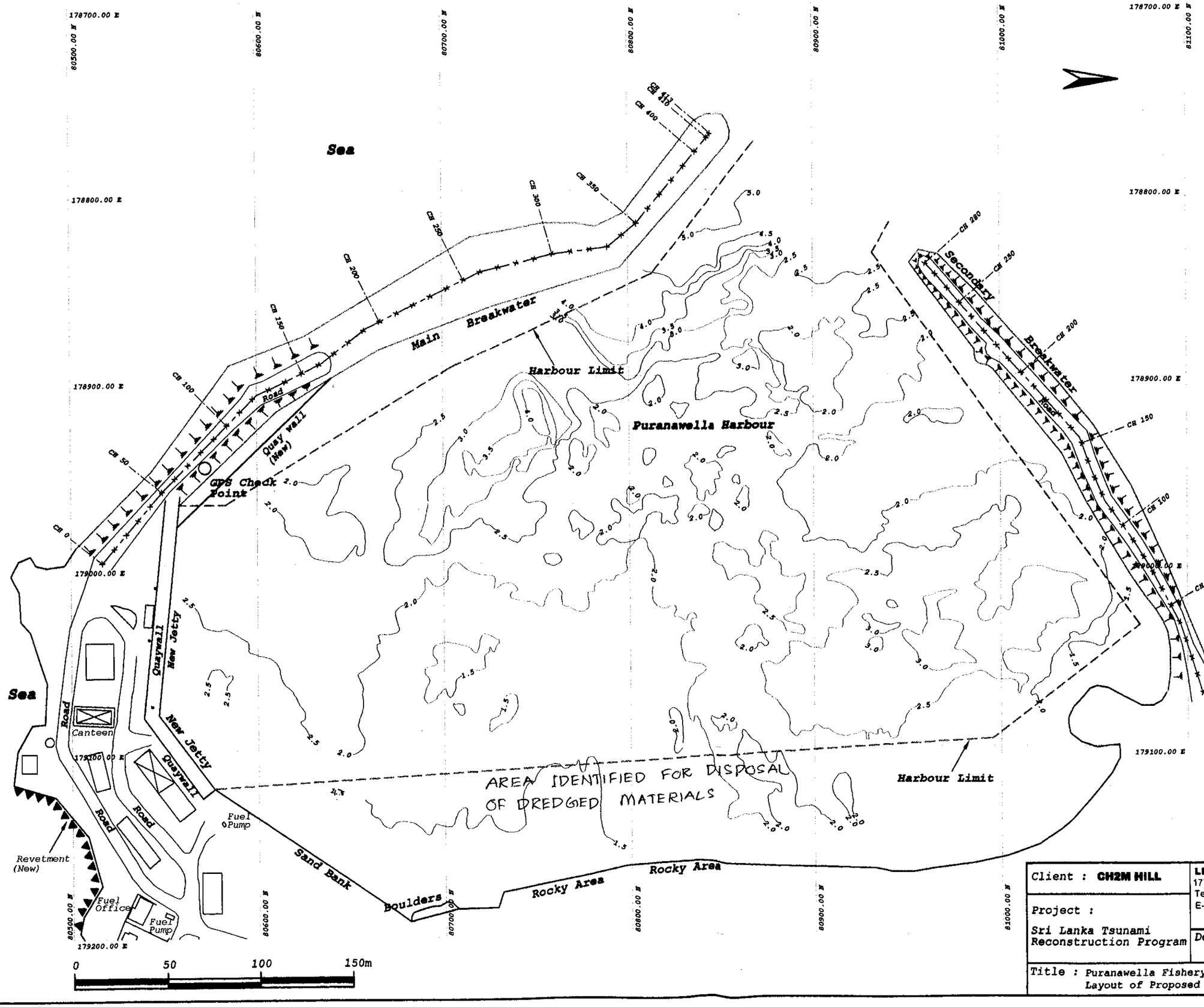
Annex 1 – Members of the EA team

Name	Position	Responsibility
Ms. Nadeera Rajapakse	Lead Author and Overall Coordinator	Co-ordination of team, compilation of the biological environment for Puranawella, compilation of full report, editing of report and the final presentation of report
Dr. Mahesh Jayaweera	Environmental Engineer	Compiling the physical environment of Puranawella
Mr. K. Jinapala	Social Scientist	Compilation of the socio-economic environment of Puranawella
Dr. Vasantha Siriwardhena	Environmental Engineer	Compilation of the project description and reviewing the final report
Ms. Amy Bodmann	Participatory Coastal Management Lead	Reviewing the final report
Socio-economic survey team	Data collectors	Collection of socio economic data for the EA

In addition to the responsibilities mentioned above, the entire team participated in the identification of possible impacts and proposing suitable mitigatory measures.

Annex 2 - Layout plan of proposed harbor rehabilitation work



Work Proposed under this contract

Main Breakwater (413m)	
1). 1-2T armour filling required - Seaside	0 - 50m
2). 4-6T armour filling required - Seaside	50 - 120m
3). Toe repair - Seaside	140 - 200m
4). Re-arrangement of armour stones - Seaside	200 - 250m
5). 6-8T stone placed on top of seaward side (Reduce overtopping)	0 - 413m
6). Repair existing road	0 - 150m
7). Provide roadway on B/W	150 - 413m
8). Available armour for use	1-2T(20 Nos) 2-4T(10 Nos)
Secondary Breakwater (280m)	
1). Harbour side slope repair	50 - 70m 80 - 100m 150 - 175m 220 - 240m
2). Head repair No of armour needed (6-8T)	25 Nos
Revetment (New)	
70m length - 17m width of fill 65m length - 10m width of fill	135m
Quay Wall (New)	
Total length	100m
Dredging (upto -3m MSL)	
Hard material to be dredged	~ 50,000m^3
Sand volume to be dredged	~ 40,000m^3

Client : **CH2M HILL**	**LHI - LANKA HYDRAULIC INSTITUTE LTD.** 177, John Rodrigo Mawatha, Katubedda, Moratuwa, Sri Lanka Tel : +94(11) 2650409, +94(11) 2605472-3 Fax : +94(11)2650470 E-mail : admin@lhi.lk Website : www.lhi.lk		
Project : Sri Lanka Tsunami Reconstruction Program	Design By: -	Drawn By: TMS	Date: 08-12-2005
Title : Puranawella Fishery Harbour - Layout of Proposed Work		Scale: As shown	Drawing No: PUR 1

Annex 3 - Detail socio-economic statistics in Project impact area (eight GN divisions)

GN division	Population by gender		Total population	Fisheries population by gender		Total fisheries population	% of fisheries population of total population
	Female	Male	-	Female	Male	-	-
Welegoda	651	663	1314	593	602	1195	90
Devinuwara-Central	497	485	982	463	452	915	93
Devinuwara-West	338	324	662	291	280	571	86
Devinuwara-North	1297	1688	2985	1141	1485	2626	88
Gandara watta	598	557	1155	496	462	958	83
Sinhasana Place	569	443	1012	530	412	942	93
Predeepagara Place	755	690	14445	656	601	1257	87
Devinuwara – East	500	450	950	467	419	886	93
Total	5205	5300	10505	4637	4713	9350	89

Table 1- Population in project impact area (eight GN divisions)

GN division	No attending schools		Not attended school		1-5		6-10		O/L		A/L		University	
	No	%	No	%	NO	%	No	%	NO	%	NO	%	NO	%
Welegoda	210	16	14	1	290	22	263	20	276	21	235	18	26	2
Devinuwara-Central	176	18	10	1	235	24	314	32	137	14	98	10	12	1
Devinuwara-West	133	20	19	3	166	25	218	33	73	11	46	7	7	1
Devinuwara-North	448	15	59	2	776	26	1084	36	358	12	238	8	22	1
Gandara watta	208	18	10	1	254	22	395	34	150	13	115	10	23	2
Sinhasana Place	163	16	21	2	303	30	223	22	134	13	140	14	28	3
Predeepagara Place	260	18	14	1	303	21	434	30	218	15	187	13	29	2
Devinuwara – East	161	17	28	3	266	28	276	29	115	12	95	10	9	1
Total	1759	17	175	2	2593	25	3207	30	1461	14	1154	10	156	2

Table 2- Educational levels among communities in project impact area (eight GN divisions)

GN division	Govt. sector		Private		Fisheries		Other		Total
	No	%	NO	%	NO	%	No	%	-
Welegoda	65	8	97	12	537	66	113	14	812
Devinuwara-Central	64	10	116	18	390	61	70	11	640
Devinuwara-West	24	7	32	9	266	75	32	9	354
Devinuwara-North	62	4	188	12	1194	76	126	8	1570
Gandara watta	42	7	96	16	391	65	72	12	601
Sinhasana Place	47	8	71	12	436	73	43	7	597
Predeepagara Place	52	6	122	14	650	75	43	5	867
Devinuwara - East	49	8	93	15	429	69	49	8	620
Total	405	7	815	13	4293	71	548	9	6061

Table 3- Employments in eight GN divisions (the project impact area)

GN division	5000<		5001-10,000		10,001-15,000		15,001-20,000		20,000>		Total families
	NO	%	NO	%	NO	%	NO	%	NO	%	-
Welegoda	47	12	115	29	112	28	63	16	59	15	396
Devinuwara-Central	52	22	62	26	69	29	28	12	26	11	237
Devinuwara-West	26	17	38	25	43	28	29	19	17	11	153
Devinuwara-North	120	21	109	19	161	28	104	18	80	14	574
Gandara watta	42	17	50	20	91	37	42	17	22	9	247
Sinhasana Place	23	15	28	18	46	29	45	28	16	10	158
Predeepagara Place	55	19	61	21	79	27	61	21	36	12	292
Devinuwara - East	34	16	40	19	51	24	60	28	28	13	213
Total	339	18	503	23	652	27	432	18	284	13	2270

Table 4 - Income levels among families in project impact area (8 GN divisions)

Production system	Information on expenditure and income
1	• **Type of boats used**- Small canoe, Small mechanized boat or wooden traditional boat • **Number persons involved**- 2 • **Varieties of fish normally caught**- *Alaguduwa, Hurulla, Linna, Bolla, Salaya* • **Daily catch**- 80 Kg • **Sale price (average)**- Rs50 /kg • **Gross income/day**- Rs 4000 • **Daily gross cost**- Rs 1300 (fuel), Rs. 300 meal, Other Rs 200 and total Rs 1800/day • **Net income/day**- Rs 2200 • **Distribution of the net income**- Rs 1100 (for the boat owner- 50% of the total net income) • **For two helpers**- Rs 550 each (Balance after deduction of the boat owner's share)
2	• **Type of boats used**- One day mechanized boats • **Number persons involved**- 3 • **Varieties of fish normally caught**- *Alguduwa, Linna, Balaya ,Gal malu and Talapath* • **Daily catch**- 250kg/day • **Sale price (average)**- Rs 65/kg • **Gross income/day**- Rs. 16,250 • **Daily gross cost**- Rs 2500 (fuel), Rs. 500 meal, Other Rs 500 and total Rs 3500/day • **Net income/day**- Rs 12750/day • **Distribution of the net income**- Rs 6375 (for the boat owner- 50% of the total net income) • **For 4 helpers**- Rs 2125 each (Balance after deduction of the boat owner's share)
3	• **Type of boats used**- Multi-day mechanized boats • **Number of persons involved**- 5 • **Varieties of fish normally caught**- *Balaya, Talapath , Kelawalla, Moru, , Sapparu, Kopparu* • **Monthly catch**- 3000 kg of raw fish and 4000kg of dry fish • **Sale price (average)**- Rs 80 /kg raw fish and Rs 100/kg dry fish • **Gross income/month**- Rs. 440,000 • **Monthly gross cost**- Rs 100000 (fuel), Rs. 45,000 meal, Watcher Rs 7,000, ice Rs 25,000 , Salt Rs 7,000 and maintenance Rs 10,000 and total Rs 194000/month • **Net income/month**- Rs 246,000/month • **Distribution of the net income**- Rs 123,000 (for the boat owner- 50% of the total net income) • **For 5 helpers**- Rs 24600/month each (Balance after deduction of the boat owner's share)

Table 5 – Details of cost of production and income of 3 production systems

GN division	Completely depend on fisheries as income		The families having other supplementary income sources		Total fisheries families
	NO	%	No	%	-
Welegoda	288	80	72	20	360
Devinuwara-Central	167	76	53	24	220
Devinuwara-West	89	68	42	32	131
Devinuwara-North	314	62	191	38	505
Gandara watta	176	86	29	14	205
Sinhasana Place	104	71	43	29	147
Predeepagara Place	178	70	76	30	254
Devinuwara - East	137	69	61	31	198
Total	1453	72	567	28	2020

Table 6 - The composition of income sources of harbor beneficiary families

Type of boat	**Number**	**%**
One day boats	17	5
Multi-day boats	333	89
Mechanized canoe	8	2
Traditional wooden boats	14	4
Total	372	100

Table 7- Type of boats being used in the Puranawella harbor

Boat size	**Amount- Rs/month**
Oru	50
OBM	115
28-29 feet	230
30-34 feet	460
35-39 feet	690
40-44 feet	920
45-49 feet	1150
50-54 feet	1380
55-60 feet	1800

Table 8 - Monthly registration fees collected from the fishermen (prevailing tariff system)

Annex 4 - Map showing the location of rock quarry


Magallagoda
Ettalenadugala
Mahakenda
Nawinmana North
Dolahona
Kekanadura
Amunekuttiya
Talagahahena
Kotigalkanda
Parawahera
Parawehera
M A T A R A F O U R G R A V E T S
Hungangoda
Galagammana
Malagoda East
Dapanagegoda
Hiridenikanda
Delligashena
Kekanadura
Quarry
Motagedara
Pahalagoda
Nawimana North
Malagoda West
Nawimana South
Madawala
Naotunna
Central
East
Weragampitiya
Gandaragoda East
Nawimana South
Udugangoda
D I V I S I O N
Pangiriwatta
W E L L A B A D A P A T T U W A
D I V I S I O N
Talpawila North
Sunny Side
Talalla North
Ipitagoda
Wehelgoda
Makawita
Talpawila
Naotunna
Gandaragoda
Gandaragoda West
Walpola
Wehelgoda
Wewalhalagoda
Wewa Ihalagoda
Talpawila East
Thalpawila South
Talalla South
Matara
Uyanwatta South
Kumbalgama
Velgalla
Ginigasmulla
Gamagewattugoda
Kapugama West
Alahenpita
Kotuwegoda
BROWNS HILL 153
Pallimulla
Waharajjawatta
Kurunduwatta
Kapugama East
Talalla South
Ruhunu Campus
Meddawatta
Gandarawatta
Kapugama West
Rassandeniya
Gandara West
Kapugama East
Gandara East
Radamulla
Gandara West
Devinuwara North
Dondra North
Devinuwara East
Devinuwara West
Devinuwara South
Dondra West
Dondra East
Dondra Head
B 54
100
Scale

Annex 5 - List of persons interviewed during the preparation of the EA for Puranawella fishery harbor

Name	Position and address
Planning assistant	Devinuwara Divisional secretary office
Manager	Puranawella Fishery harbor
Assistant Manager	Puranawella Fishery harbor
Fisheries Inspector	Puranawella fishery harbor
LP. Kulathunga	Puranawella, Devinuwara
A.P. Anura	Puranawella, Devinuwara
M.M. Saman	Puranawella, Devinuwara
M.P.Salamon	Puranawella, Devinuwara
G.P.H Chndrakumara	Puranawella, Devinuwara
Daminda Abedeera	Puranawella, Devinuwara
Wasantha Gunawardhana	Puranawella, Devinuwara
Dayani Perera	Puranawella, Devinuwara
M.M. Predeep	Puranawella, Devinuwara
Predeepa Sellahewa	Puranawella, Devinuwara
P.M. Wasantha	Puranawella, Devinuwara
Ranjith Wijesekara	Puranawella, Devinuwara
H.A. Sunil Shantha	Puranawella, Devinuwara
J.P. Dhanapala	Puranawella, Devinuwara
Jagath Kumara	Puranawella, Devinuwara
D.S. Wimaladasa	Puranawella, Devinuwara
K.P. Indranee	Puranawella, Devinuwara
K.P. Adlin	Puranawella, Devinuwara

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Sri Lanka Tsunami Reconstruction Program (SLTRP)

USAID Contract # 386-C-00-05-00166-00

Harbor Consultations Report

December 22, 2005

CH2MHILL

In association with CHEMONICS, DEVTECH, FNI, Engineering Consultants LTD., EML Consultants, Lanka Hydraulic Institute, MICD and Uni- Consultancy Service

Harbor Consultations Report
December 22, 2005
Sri Lanka Tsunami Reconstruction Program

CONTENTS

Harbor Consultations Report
December 22, 2005
Sri Lanka Tsunami Reconstruction Program

Section I. Executive Summary

Project Background

The Sri Lanka Tsunami Reconstruction program (SLTRP) was implemented in response to devastation inflicted by a tsunami that swept over more than 700 miles of the Sri Lankan coastline on December 26, 2004. The program has three aspects which includes physical reconstruction, vocational education and coastal management components. The SLTRP adopts a cross cutting participatory in these components that aims to promote community ownership of the project interventions.

The Harbor Consultations

In the start up stage, the project looked at the community consultations and meetings as a way to kick start the participatory component of the project. Concurrently observations were made towards developing a strategy to take the participatory approach forward in this project that would potentially play a role in setting in place the longer term goals of the project. This report provides an overview of the outcomes of these initial consultative meetingsby the Sri Lanka Tsunami Reconstruction Project (SLTRP) team in the harbors and highlights the priorities the fishing community selected for consideration in the harbor reconstruction components of the project.

The consultations were carried out early in the project assessment phase to allow stakeholders an opportunity to provide input to fishery harbor reconstruction. Additionally, the intention was to solicit information that would provide the groundwork for catalyzing a participatory coastal resource management and planning exercise, which will be defined as work progresses in collaboration with USAID.

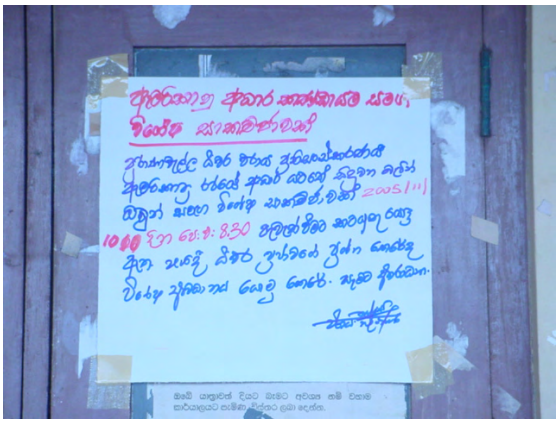
For reasons of proximity the first series of consultations were organized in the harbors with the "Harbor Fishery Committees" (comprised of a membership of the fishermen using each harbor) through the facilitation of the harbor managers with support from the project. Due to the presence of a wider fishing community outside the harbors, some meetings were conducted with fishing community, women's groups and families outside the harbors, to solicit information on the prevailing context to support a participatory coast management plan in the future. Notes from these discussions have been presented in Annex 4 of this document, so as not to detract from the issues raised inside the harbors necessary for the reconstruction component. .

The team from CH2MHill carrying out these meetings consisted of Mr. Anil Premaratne, Participatory Coast Management consultant, Ms. Nadeera Rajapakse, Environmental lead, Ms. Tania Weerasooria, Outreach and Public Awareness consultant and Ms. Amy Bodmann, Coastal Zone Management consultant. The team concludes that, although these initial meetings were a valuable first step, further arrangements to bring tangible benefits to community needs to occur in the short term as the construction develops. In-house team discussions to identify ways to do this have taken place and will get formalized as the project evolves. Through these strategies it is intended to promote user community ownership of the construction process.

The consultative process indicated that three fundamental needs exist in all three sites with regards to harbor infrastructure; these include: 1) safe access and entry into the harbor; 2) dredging to allow for more effective use of the harbor space; and 3) addition, extension, or rehabilitation of quays, jetties (anchoring facility), and breakwaters to secure the safety of boats docked within the harbor, and improve efficiency of services (i.e. reduce turn around time of boats). The unique issues identified in each harbor by the groups consulted, both multi-day boat and small boat owners, are described in more detail within this report.

Section II: The Approach

With the endorsement of the Ceylon Fisheries Harbor Corporation (CFHC) HQ in Colombo, the project contacted the harbor manager in each respective harbor selected for reconstruction under this project. On an initial visit to these sites the harbor managers agreed to organize consultation sessions to solicit feedback from fishermen in the harbor with involvement from the project team to lead the discussions.



- Annoucement and Gathering at Puranawella

Among other meetings held by the SLTRP team in preparation for the consultations, a meeting was held in Colombo with the USAID Transparent and Accountable Local Governance (TALG) Project. The result of this meeting was an agreement to collaborate, specifically through the use of officers in the Local Authorities who were trained by the Asia Foundation as facilitators to assist in the consultation activities. An intention here was also to build linkage with another USAID intervention in the area and facilitate synergies that would benefit the overall impact of the projects in the longer term.

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The planned agenda for each session was to identify and discuss the issues in each harbor, allow time for facilitated group work under the headings – a) infrastructure, b) management, c) social d) economic e) environment; and finally to review and prioritize issues in plenary sessions. However in practice, the group work only partially followed this format, and that too only at two of the locations, with the dominant voices, mainly multi-day boat owners taking control of the discussions. A second round of consultations through focus group meetings with small boat operators were also carried out for each harbor . Given what the fishermen expected from the project, the discussions

were mainly around the issues of the subject of infrastructure, and the other topics were only marginally addressed. For the construction component this has been deemed sufficient at this stage of the project, and it is believed that an initial sense of involvement has been created within the fishermen in the project planning process.

Section III: Priority Issues Identified at each Harbor Consultation

Provided in this section are the issues and requirements that emerged from the harbor consultations in general at each locality, and below that the specific issues prioritized at each locality. Annex I to III presents the issues at each site listed in the order that they were raised, with the issues selected as priority during the last stage of discussion given a ranking number. In the main body of the text only the priority list has been provided.

- Meeting in progress, Mirissa

The informal discussions following the closure of the meeting and during the walk-about with the fishermen inside the harbor with volunteers identified during the session, point to three main cross cutting issues in all three harbors. These are -

a) Access to the harbor from the sea, (especially at Hikkaduwa);
b) Depth of the harbor; and
c) The need to extend quay /and anchoring facility in a manner that protects boats from various risks of damage, and basic facilities such as fuel, drinking water, etc.

As stated, the full lists of issues identified at each harbor are provided in annexes to this report.

In the case of the small boat owners, the three main issues highlighted were as follows -

a) The reconstruction to provide a separate area for anchoring of small boats
b) In proximity to this anchoring area, provide a lower pier so that the larger boats would not encroach into that area.
c) Provide a kerosene oil pumping station within the harbor in proximity to the small boat anchorage. These three services, if provided, would encourage payment of the harbor

fee to the Corporation, they said. Presently very few small fishermen are registered within the harbor as services to them are limited.

The above sets of factors were highlighted by multi day boat owners and small boat owners respectively. The first round of consultations at each harbor site with the Harbor Fishery committees, highlighted the harbor requirements for multi-day boat, but many of these are of relevance to the small boats as well. The general concerns of the small boat owners which were captured separately, have been presented in boxes below the priority list for each harbor as stated by the fishermen.

Puranawella Harbor

The following issues were identified and flagged as priorities by the Harbor Fishery Committee at Puranawella Harbor:

- Priority No. 1: The need to deepen the harbor basin, including removal of boulders, was a main issue prioritized by the fishermen in this harbor. An underlying qualification to this request was to make the access to the harbor safer. The depth in this harbor in some places is as low as one meter. For the proper utilization of this harbor a depth of three meters in the harbor basin was requested.
- Priority No. 2: Inadequate anchoring facilities in the harbor for securing the boats were highlighted by the fishermen. Extension to the existing pier facility has been suggested along the breakwaters and/or even in the middle of the harbor water as a floating jetty, in a manner that protects boats from damage due to boat congestion and wave action in the harbor. At present there area wave actions and currents that comes into the harbor that jostles the anchored boats and cause damage.
- Priority No. 3: The need to extend quay facilities specifically to enable unloading and refueling, loading water, supplies, etc. The fishermen consulted suggested that this could be added along the breakwater, if feasible.
- Priority No. 4: Boat repair facilities are lacking inside the harbor, and the need for crane and slipway facilities was presented.

- Group work at Puranawella

- Priority No. 5: There is a need to relocate the toilet facility. The participants expressed concern over the fact that there was yet a handful among them using the beach for their toilet purposes. This was due to both the inconvenient location of the existing toilets, as well as the habit of living close to the elements as the fishermen are used to. There was interest to have the toilet relocated and expanded facilities combined with interventions from the Public Health Inspector to motivate and enforce use of the toilets. (it is our view that this should be together with the Harbor Fishery Committees if to obtain results)

The attendant list of this meeting records 65 fishermen participating in this meeting, many of them multi-day boat owners/users. The meeting was conducted with a notable enthusiasm on the part of the fishermen present to express their concerns. The full list of concerns expressed demonstrated acceptance of the environmental issues in the harbor, for fish waste and other refuse. Garbage bins and other solutions were requested.

Notes on the general concerns of the small boat owner fishermen:
Puranawella:
"Our small boats break when the larger ones knock against them. The harbour is filling…it needs to be dredged. We badly need pier facility separated out for our boats. Also, there is no place for boat repair when engines break down and we are forced to transport it to distant workshops, another expense. Insider the harbour there is no place for resting. We need a place to keep an engine safe inside the harbor so that we don't have to carry them all the way to our homes. The Sanasa and the Ceylinco small credit schemes for women are operating in this area. Our women folk take these loans and help us with buying nets and other fishing equipment we need".

Mirissa Harbor

The following issues were identified as priorities by the Fishery Committee at Mirissa Harbor:

- Priority No. 1: The committee identified the need for three jetties to anchor day boats and multi-day boats separately to prevent damage (two piers for large boats, one for small boats). At present large and small boats can be seen tied into together at the piers. There is a need to introduce more order and efficiency into the docking system, in addition to extending the existing docking facilities.
- Priority No. 2: No suitable location currently exists in the harbor for boat repair and improvement. It seems that boat damage occurs frequently in this harbor. There had previously been a boat repair facility which had been leased out to a private operator on a 33-year plan. This facility was not functioning or was operating very poorly, even leading to further damage of boats, and consequently not being used by the fishermen.
- Priority No. 3: The ice plant was damaged by the Tsunami, and no longer produces ice. There is a building in this harbor that had housed an ice plant previously. As in the case of the boat repair facility, this had been given on a 33-year lease to a private operator. But this too remains non-operational (not clear if this was the case even before Tsunami; will have to check from Harbor Managers).
- Priority No. 4: The auction hall at the edge of the pier is blocking the entry of vehicles for loading; therefore the participants expressed a desire to relocate to another position. An auction

hall had been built by the Harbor Corporation at a location against the wishes of the fishermen. This building is sited very close to the quay and restricts the fish unloading activities.

- Priority No. 5: The speed of the fuel machines is very slow, and an increased number of fueling points would improve efficiency. There were several complaints due to the delays experienced at unloading, refueling and loading points. This was the rationale behind this complaint (and the following point). A keen management look at this operation was requested to make this process more efficient.
- Priority No. 6: Water availability for both washing of fish and drinking purposes (water pipe connections) is not meeting demand.
- Priority No. 7: There was an expressed need for slipway or mobile crane (cheaper maintenance option) for repairs. This point is connected to the request for a repair workshop facility (Priority No. 2)

The attendant list of this meeting records 46 fishermen participating in this meeting, many of them multi day boat owners/users.

Notes on the general concerns of the small boat owner fishermen:
Mirrissa
"We need a clearly demarcated area for the small boats. It would really help if an area is construct to get on and off the boats, and a place to hang (anchor) the boats. The places where the rock wall is falling needs to be secured. The method of fishing we mainly practice in our small fishing boats is *course-line*. (Anil is this correct) About 8-10 persons go in a course line boat".

Hikkaduwa Harbor

- Drawing of harbor brought by the fishermen. Issues raised during discussion being noted down by facilitator (trained by the USAID/TALG project)

The following issues were identified as priorities by the Fisheries Committee at Hikkaduwa Harbor:

- Priority No. 1: The entrance to the harbor from the sea is treacherous. This needs to be made safer, for example by shifting out the breakwater. The issue of safe passage was expressed in various ways at each harbor discussion, and was most emphasized at Hikkaduwa.
- Priority No. 2: Deepening the harbor. This again was a recurrent issue in each harbor with the most acute appearing to be experienced in Hikkaduwa.
- Priority No. 3: Reconstruct jetty from northern side. Another recurring issue, this request was to extend the boat docking facilities, either using a breakwater in a duel role, or in another manner as the engineers find feasible through their investigations.
- Priority No. 4: Security within harbor is an issue; there was a request for the construction of a security wall around the harbor. (Note: This request was made by the UC Chairman, and it was not clear how much the fishermen request this.)
- Priority No. 5: Extend breakwater in north to the length of the southern breakwater. (There is some lack of clarity and consensus on what the true issue is with regard to this point; however keen interest was shown on this matter (connected to Issue 1 on safe access to harbor from the sea). The fishermen gathered for the meeting had come with a colored drawing of the break water locations in the harbor to illustrate how they perceive the structures would best support the safety factor. The SLTRP team made clear to the participants that these matters will get decided upon following the hydraulic and engineering investigations. It is recommended the designs – once closer to finalization – are presented by the project engineers directly to the fishermen, to appeal directly for the latter's buy-in and understanding prior to finalization and construction.
- Priority No. 6: A crane to lift multi day boats is needed. Again, a lack of repair facilities is a recurring issue in all three harbors. This point and the following relate to this concern.
- Priority No. 7: A workshop to repair engines.

The attendant list of this meeting records 45 fishermen participating in this meeting, many of them multi-day boat owners/users.


- Discussion in progress at Hikkaduwa

Notes on the general concerns of the small boat fishermen

Hikkaduwa

"We badly need anchoring and pier facility separated out for our small boats. In doing this it would be very useful if the piers demarcated for us are constructed at a lower level than for the multi-day boats. This would deter the big boats encroaching into our pier facility area. An ice plant would be of great help to improve the marketing and the price we can get for our fish catch. If these matters can be addressed it would very helpful".

At Hikkaduwa a discussion with the Harbor Manager pointed to security issues in the Galle harbor prompting the navy point there to disallow Hikkaduwa registered boats to dock in Galle, even in case of emergency. This prompts the fishermen of this harbor to register their boats in Galle, which results in the income collection at the Hikkaduwa being negatively affected.

In regard to the request for a wall around the harbor, which was prioritised with some inputs by the local authority chairman, the harbor manager states that this is useful for the fishermen (as even for the Corporation) as it would help to keep their boat equipment safe. The length of the wall is approximately 1000 meters.

Section IV: Lessons Learned and Next Steps

The lessons learned through these initial discussions is that these were challenges faced due to the short time frame this process was allowed given the requirement to have input from these consultation before the construction work started. Further, it is now clear that some level of in-situ mobilization and facilitation of these Harbor Fishery Committees would be required to bring more voices to the process on an on-going basis and promote the fishery community ownership of the construction process. As an initial activity this two tired consultation has demonstrated to the harbor user community the project interest in helping to make their voices heard.

Additionally, discussions were held with fishermen operating in the surrounding fishing area, families, some women's group CBOs that have proved sustainable in the area. Notes from these discussions have been presented in Annex 4 to be considered as initial ground breaking in regard to developing participatory coastal resource management plans. The fishing community and the coastal community in tourist areas have tasted the fruits of hard work, and likely to be a dynamic and entrepreneurial group to work with if presented with the right signals and opportunities.

All groups met had no objections to the harbors and were keen that the issues of the fishermen were met. In Hikkaduwa however, there were some apprehension expressed by the Hotelier group at the recent phenomena of sand deposits in the marine sanctuary area (independent of the tsunami). The hotelier community acknowledge that the fishermen have to operate and pursue their livelihood, but steps need to be taken to study the reasons behind the sand depositing process, and find a way to clear sand depositing on the coral.

It should be noted that government policy is to promote use of the harbors for multi-day boats more so than for day boats. In addition to analyzing the demographic composition of stakeholder groups at our sites, we also need to come to firm agreement with GoSL and USAID about who our target beneficiaries will be, and how the project proposes to deliver services to them. It may just be the reality that those services may not be delivered uniformly among different groups. For example, in terms of benefiting directly from use of the harbors, the multi-day boat owners may continue to be the dominant group. However, plans to benefit other stakeholders (e.g., small businesses, shore fishermen, women and youth, marginalized groups) through other project investigations, i.e. promotion of on-shore livelihood activities, vocational training, coastal resources management, and awareness-raising activities are envisaged.

Towards building community ownership of the construction process itself and an appreciation of the benefits they will get from the harbor through the reconstruction, several team members have suggested that small visible achievable activities be handed to them. Further, identifying mechanisms to have fishermen's involvement in the construction supervision has been recommended. These interventions will be discussed through with the counter part agency, in this case the Ceylon Fishery Corporation, and suitable operational methods formulated.

Annex I: Puranawella Harbor Consultation

Unabridged List of Issues Identified by Puranawella HFC Consultative Group – Presented in order in which they were raised and subsequent prioritization.- 10th Nov 2005.

- Deepening harbor basin, including removing boulders (for safer access). Presently the depth is as low as 1 meter in some areas of the harbor; ideally it should be 3 meters. **(Priority 1)**
- 2/3rds of the space in the harbor is not utilized due to heavy siltation and rocky substratum.
- A current that comes from under the pier and breakwater causes significant jostling of boats.
- Inadequate pier facilities exist in the harbor. Extensions to the existing pier facility have been suggested along the breakwaters and/or in the middle of the harbor **(Priority 2)**
- Pier facilities for docking are desired along the breakwater **(Priority 3).**
- Inadequate anchorage facilities for tying up boats
- Fishery auction hall is not large enough to fulfill requirements.
- The point of entry to the harbor from outside is narrow and scattered with rocks and boulders. They need the passageway to be safer, and indicated that hundreds of deaths have occurred at entrance over the last several decades for this reason.
- Want a beacon placed on the rock outcrops for guidance, basic navigation and safe entry. The name of the rock Galkelawaragala.
- The access road onto the breakwater was damaged by the Tsunami
- A Boat repairing location and facility is needed inside the harbor, including slipway. **(Priority 4)**
- Two slipways (one large, one small) are needed, along with crane facilities
- Ancillary facilities for fisherman (e.g. for washing, bathing, toilets)
- Relocate toilet facilities. Existing facilities are insufficient (only two) and improperly placed **(Priority 5)**
- Access road to the harbor needs to be rehabilitated – Bandaranayuka and Bunapala Mavata.
- The netting hall is not big enough, also during rainy weather work has to stop because the rain beats in.
- There is a planned road for Velamadema to the harbor that hasn't been constructed.
- Add another level to the auction hall and make it a rest area for fishermen.
- Need an ice plant.
- Fuel pumping stations need to be increased in number; currently only one.
- Need more water taps; currently only have two
- Want electricity supply within the harbor to be improved. Regular power cuts occur, which prevent radio, pumps, etc. from functioning.
- Generator for when power is cut.
- Security – there is no security system. Fencing harbor and building security huts are suggestions. Equipment isn't secure in the harbor.
- Radio signaling facility isn't strong enough. This is a security issue.
- Need improved facility for unloading the boats.
- No proper waste disposal is available to dispose of fish waste, solid waste, burnt oil, etc.

- Garbage bins are needed.
- The tax to use the harbor is too high
- Right now the trolleys for raising/lowering boats are being hired out by the private sector at a high cost; preference for the harbor to have this facility.
- Prices attained for fish catch are too variable, e.g. when fish catch is high or low

Annex II: Mirissa Harbor Consultation

Unabridged List of Issues Identified by Mirissa HFC Consultative Group – Presented in order in which they were mentioned and subsequent prioritization. - 11th Nov 2005

Infrastructure

- Insufficient space on the jetty
- Harbor basin has filled up with sediment
- Need for a protective barrier on the jetty to prevent breakage of boats (rubber tires and sandbag barriers – currently used for this purpose – break off easily)
- Large and small boats are being parked together, and this causes damage
- No location for boat repair and improvement **(Priority 2)**
- The auction hall at the edge of the jetty is blocking the entry of vehicles for loading; therefore would like to relocate to another position **(Priority 4)**
- There is water collecting in certain spots in the auction hall
- The speed of the fuel machines is very slow, and an increased number of fueling points would help **(Priority 5)**
- Water availability (water pipe connections) are insufficient **(Priority 6)**
- The ice plant was damaged by the Tsunami; does not produce ice **(Priority 3)**
- Need for three jetties to park day boats, multi-day boats separately (two piers for the big boats, one for small boats) **(Priority 1)**
- The netting hall is insufficient (too small; rain enters)
- Need for slipway or mobile crane (cheaper maintenance option) for repairs **(Priority 7)**
- Need for a workshop
- Toilet facilities are too far away and insufficient in number
- Would like resting rooms for the fisherman
- High rate cost water
- Beacon lights in two locations (marked on map)
- Electricity system in the harbor is not working properly
- The signaling station doesn't have a proper building, e.g. with telephone and rest facilities

Environment

- No place for putting fish refuse and waste
- The water in the drainage system stagnates; doesn't flow out properly
- The drainage from some of the surrounding homes enters the harbor water and collects in the harbor (waste from the community, human waste)
- The refuse generated in the harbor (plastic, fish heads, etc.) don't have a location for collection
- Sanitary facilities are insufficient

Management Issues

- Lack of management committee
- Non-availability of a boat for common purposes

- After fueling, difficulty of pulling out boats (i.e. fueling system is not efficient)
- Because of all the fishing equipment (netting, etc.), there is not enough space to unload fish and conduct auction in the auction hall
- Certain other harbors bring their fish loads to Mirissa to sell, driving down prices.

Social and Economic Issues

- Unfair prices for fish catch (due to dumping by outside fishers)
- No selling place for fishery equipment (can't buy equipment there)
- Want to export dried fish; believe there is a market for exporting dry fish

Annex III: Hikkaduwa Harbor Consultation

Unabridged List of Issues Identified by Hikkaduwa HFC Consultative Group – Presented in order in which they were raised and subsequent prioritization. – 12th Nov 2005

Infrastructure

- The opening to the harbor from the sea is treacherous. Make it safe, by shifting out the breakwater. **(priority one)**
- Deepen the harbor basin **(priority 2)**
- Reconstruct Jetty from northern side **(priority 3)**
- Provide fueling facilities for kerosene oil
- Facilities for ice making within harbor
- Long time required for collection of drinking water; find a way to address this problem
- Security within harbor is an issue; construct a wall **(priority 4)**
- Relocate and expand toilet facilities
- Provide place to store fishing equipment.
- Electricity supply within harbor not sufficient
- To light up harbor mouth, provide a beacon lamp
- Set up another pier on the northern side of harbor
- Construct an auction hall for selling of fish
- Extend breakwater in north to the length of the southern breakwater **(priority 5)**
- A crane to lift multi-day boats **(priority 6)**
- A workshop to repair engines **(priority 7)**

Environment

- Fish refuse is put into the harbor
- Town waste is dumped in harbor at times

Economic and Social

- Not enough facilities to sell the fish (no auction hall)
- No icing facilities, and that which is available outside being very expensive.

Annex 4: Discussions Outside the Harbors with Fishing Community, CBOs and Families

Puranawella

Location: Kaisawella – A discussion with small holder fishermen (one day boat operators). A location within distance of 1.5 km of the harbour.

Summary of issues

- break water/ rocky outcrop to make their bay safe
- rock blasting to chart a course for the fishing boats
- Help to start up their society with some project intervention.
- Home based income generating activity for women
- Employment for second generation

The participants were mainly one day boat owners, or poor fishermen working on big boats as well as carrying out near shore fishing activity. The average age of this group of fishermen was in the range of 40 to 50 years. Over 27 fishermen participated at this group meeting, having gathered at a coastal community building located close to their boat docking area.

This was a natural small bay, conducive for a fishing harbor, but having issues of strong current and rocks in the bay that made the launching of boats out into the open sea a risky activity. Due to lack of any other means of a livelihood these fishermen continued to operate in this area. Although our discussion began around the harbor, the concern of these fishermen were to make this area more secure for fishing boats and enable a safe access to the sea. This location was convenient for them as this was close to their homes and they could ensure the safety of their boats.

They requested that a rocky outcrop be constructed near the light house at visible distance from the shore, and thereby find a way to make the strong wave current into that small bay area manageable for the launching and access of their fishing boats. Other concerns included looking into the possibility of rock blasting to enable safe access of fishing boats. The CCD is going to look into the possibility of the government taking up the matter of a break water and clearing the rocks.

CBO Activity of above group

A community grouping by the name of “Sustainable Fishing Society” (Thirasara Deevara Samithiya), had been founded some years back in the area. This CBO was formed in association with a government programme for the fishing community that was taking place in the area some years back. Due to the lack of clear achievable objectives to be worked towards on an on-going basis this society was not fully operational at present. However the members, constituting of the fishing community in that locality, did come together on common issues. Recently they had obtained the assistance of a politician to reconstruct the community hall/ rest area that had got damaged after the Tsunami.

Two persons made reference to being family members of the Sanasa Credit Society. Their wives were the members. The women folk engaged in the preparation of dried fish when there was excess stock in the fish catch.

Following the discussion with the project team there was renewed interest among the fishermen to reform their society. They inquired into any programs that they could get involved in that this project may bring to their area. As the scope of work within the Coastal Zone Management component is still under formulation the fact they could have a role in that component was not presented at this stage.

Discussion with a typical family in the area:

On this occasion the project team also visited a home of one of the fishermen living in close proximity to this site. The occupants included the fisherman, his wife, 4 children, and his lame brother. They related the story of how they faced the Tsunami and how every one had been saved including his brother, because he had carried his brother to safety. The woman seemed an active housewife. When excess catch was available she prepared dried fish for sale. That was the extent of her income generation at present. She expressed interest to take up sewing and inquired into the possibility of obtaining a sewing machine. Three of the children were schooling and the eldest was trying to get an opportunity for computer training. The parents requested for a job for their eldest – a daughter of 19 years.

Location: Kiralawella – A group of small holder fishermen near Puranawella

Summary of Discussion/Issues

- break water/ rocky outcrop to make their bay safe
- rock blasting to chart a course for the fishing boats
- assistance to find a way to provide safe anchoring for their boats
- a building for the safe storage of the engines
- A beacon light to identify the location and light up the water at night (separate from lighthouse)

This was the next bay from the previous one, Kaisawella. The fishermen at the meeting were mostly young men in the age group of 20 to 30 years. Their main issue was also regarding the treacherousness of their bay during most of the year, making the ply of boats difficult. They reiterated the request of the previous group for a break water and rock blasting that would help both these bays. They further mention the difficulty of finding safe anchoring area for their boats. At present they are pulling their boats up on to the shore, and sometimes on the private lands of accommodating persons. They requested a more formalized system where they can safely anchor their boats. The safety of their engines is also an issue. They requested a storage structure/ or building, where they can store their engines safely.

Another request was for a beacon light (not a flasher light; the function of which is met by the light house nearby) to identify the location and light up the water way in the night into that area. The jurisdiction for such a beacon light would have to be taken up by the Divisional Secretary's office in

the area. They estimate that over 600 families are making a living from fishing in their village alone. The

participants at this discussion mostly practiced the course line method of fishing. About 7-8 persons go in a boat.

Their hopes for the future is to find opportunities for progress. In regard to operations on multi-day boats, they are confident that they have some understanding. However if training is made available in an accessible way they are interested to get a more systematic training on the use of the various types of equipment on those boats.

Discussion with Family

The mother and wife of the young fisherman in whose home the above discussion was held in were met with. The father had died prematurely of a cancer. The mother was making all efforts to augment the family income by preparation and sale of dried fish. The wife was pregnant. She had become a member of the Ceylinco bank community credit scheme, a scheme for women, and obtained Rs.5000/- as loan to help her husband buy nets for his fishing activity.

Discussion with CBO: – No 8 Grama Sanwardene Samithi, Gandara West.

Summary of discussion

- interested to obtain rope (lanu) making machines
- to be trained in some income generating activity, e.g. making bags from rope; use of 'vatakeya' (a cane plant) growing in the area, lace making, other handi crafts, etc. along with help to access market;
- Provide facility for their men folk to protect their boats
- There is a beautiful spot on the coast in close proximity to their village, make that into a park area, where not only the young boys, but families and girls can go to safely.
- Training for the pre-school teachers running their village preschool.

This village society was registered with the DS Office of the area. The village consisted of families who had developed through the fishing industry. It was a housing scheme carried out in the later 1980s/ early 90s. Discussion was conducted with the 3 office bearers, chairperson, secretary and treasurer. The treasurer is engaging in a small business running a village grocery shop. The society is operating a pre-school in the area community center. They have hired a pre school teacher and an assistant to conduct these classes. They would be interested to get training for these teachers.

The society further carries out a small credit scheme supported by funds raised within the membership. They were also the main leadership of the village funeral society, ensuring a payment of Rs. 5000/- was received by the family of the deceased.

The bearing and manner of the office bearer ladies of this group displayed a level of confidence and enthusiasm achieved through the experience and exposure to society through their group activity. They had a membership of 38 members.

Discussion with CBO: Gandara Ekamuthu Deevara samithiya (near Puranawella)

Summary of discussion

- This society is presently engaged in income generation activities, and conducting classes on school lessons (i.e. English, maths, etc), dance and music, health; and leadership/ personality training programs.
- They carry out an ongoing pre-school program.
- They carry out a micro-credit schemes
- There membership is already mobilized and interested to participate in any livelihood or community development program that is proposes.

An active CBO, the chairperson of this group had extended her own property for the pre-school activity as well as NGO assisted programmes. The chairperson, secretary, treasurer and one ordinary member participated in the discussion.

Many Government and NGO agencies work with this group. The following INGOs have assisted them in various programs in the post Tsunami period – Oxfam, World Vision, TSF, SLCDF, ICUN the focal point in the area for implementation of various program activities in this area.

Mirissa

Miriya-mada wella – (located on out skirts of Mirissa fishery harbor). A meeting with small holder. fishermen

Summary of discussion / issues -

- Sever shortage of pier facilities inside as well as outside harbor
- It is difficult getting in and out of the boats
- Separate an area within the harbor for small boats, and
- Secure the embankments and anchorage
- Provide a kerosene pumping station.
- Strengthen the marketing system so as to enable a better rate for fishermen.

According to these fishermen, there are over 150 small boats in the area, an increase from last year in the post Tsunami period. The small boat owners confessed they do not register their boats in the harbor as they felt they do not get any services from them. The social conditions among this group seemed lower than in the other harbor sites of the project. There was evidence of high incidence of alcohol consumption, indicating need for social work programs.

Discussion with a family

Meeting with a fisher family home located in proximity to the above group discussion conducted in a boat yard area, there were signs of some prosperity such as a cassette radio, tile floors and sturdily built house. The male elder of the household had died prematurely (not at sea), the elder son was engaging in fishing activity and that was the main source of their income. (course line fishing)

This family was participating in the Arthacharya solid waste management initiative and were members of the Sanasa credit society. Recently they were also involved in the Asia Foundation project with the Waligama UC (Local Authority) and had received 20 handcraft lace making machines in their area. The eldest daughter of this household was a recipient of one of these machines. Once prepared these lace items were being taken by a dealer for sale in the Galle tourist area. Despite a certain level of participation by this household in local level community activity, the need for social interventions in improved household management, personality and leadership development for the second generation, training and linking to employment, etc. were evident.

Discussion with a woman leader of the Mirissa Sarvodaya Shramadana Samithiya and Agromart Foundation

Summary of discussion -

- society membership consists of 75 persons
- as a member of the Sarvodaya group she had engage in psycho-social, spiritual and health programs
- as a member of the Agromart foundation she had received training in carrying out a small business.

The discussion was with the chairperson of the above mentioned two societies, (effectively, she was wearing a double hat). Her home was located in the tourist area in Mirissa and she was running a small tea restaurant, letting out rooms to foreigners, and in the front end of her home running a clothes shop. She had received training from the Agromart Foundation, a NGO providing book keeping and business skills training to village level women entrepreneurs.

In the post Tsunami period the Sarvodaya women's group had received training in trauma counseling to assist their community. Monthly programs were being conducted by Sarvodaya resource persons in meditation and discussion of other issues on special psycho-social and spiritual topics to help cope with sadness and loss from the Tsunami.

Hikkaduwa

- The Divisional Secretary – Ms. Kusum Piyaratne. She assured that the DS office will give the necessary cooperation to support the project implementation.

- District Manager, Arthacharya district office – Ms. Renuka Jayasinghe. This NGO is implementing environmental, community development and training programmes in the area. These include a solid waste management initiative, small group credit scheme, computer training courses, and other community development activities. They informed that a fishery anchoring site is being constructed in the Doddanduwa area, located approx 3 kilo away, where one of their credit societies were functioning. A visit to that society was arranged for the next day.

- Arthacharya CBO in Dodanduwa – Ms. Ruwanthi, the Artharchary field coordinator facilitated a group meeting of the Dodanduwa Women's group to meet with the project team. Thirty three women attended the meeting. Nearly all the families were living off the fishing industry. The

women folk were engaged in a solid waste management activity mobilized by Arthacharya. They were keen to obtain skills in hand crafts for income generating purposes, and requested sewing machines and *beeralu* (a lace making device which has evolved from the Dutch period in the area) tools.

- President, Hikkaduwa Hoteliers Association – Mr. Siri Goonewardene - A pioneer in planning and lobbying for the protection of the Marine Santuary in the area, this person provided a history of the formation of the Fishery harbor in this locality. He observed that the construction of the fishery harbor was a big achievement for the hoteliers in the area, as it cleared the marine sanctuary area of fishing boats and confined them within the harbor. But an alarming impact is being observed in the last 3-5 years, where the coral areas are getting covered with sand deposits, and it is widely believed that this has developed as a consequence of the harbor. He said he has been lobbying with both government and donor agencies on this matter, but to this date no action has been taken. He indicated commitment to keep lobbying on this issue. Another matter he was lobbying for was a by-pass road of the Colombo-Galle highway that would allow for the spread of the hotel enclave in the Hikkaduwa, and reduce the high transport traffic and noise levels in the area.

- Glass Bottom boat owners - President of this association – Mr. M. V. Jayaweera (Sunil). He informed that since the Tsunami the local tourist to the area has severally dropped. And from among the 50 boats that were previously operating, only around 8 are operating at present. Another contributory factor was that a locally run Zoo in the area had been a draw for local tourists. This institution had run into some regulatory issues and been compelled to close down.

- President, Hikkaduwa Protection Society – Mr. Pial Gunarathna. His hotel establishment was most popular among surfers. The sea in front of his hotel was good for this, and he is not affected by the sand deposits on coral. But he said this has been coming up as an issue in the area in the last 5-6 years.

- President, Small hotels and restaurants – Mr. A.B.Jayasundara – He was not available in Hikkaduwa that day, however obtained his name card from his office for future reference.

- The Chief monk, Jananda-ramaya, Hikkaduwa – He was supportive of the Harbor and was especially keen that the mouth to the harbor from the sea be made safer as he personally is aware of the danger the fishermen face even in moderate bad weather coming from the sea into this harbor. He related the case of the large boat which was awash on top of one the breakwaters, how it had first crashed on the rocky outcrops just outside the harbour prior to the Tsunami. But later got washed inland and on to the breakwater as a result of the Tsunami.

- Educational Zonal officer for Environment –Ms. N. Kalansuriya. She has been involved in teachers training programs for the area as a master teacher for three years. And during this time she also has organized several beach cleaning programs and environmental education programs with the participation of teachers and students in the area. She indicated interest to carry out environment education programs for fishermen in the Hikkaduwa fishery harbor on environment education together with students, if technical guidance is provided through “training of trainer” inputs to conduct such programs.

Annex 5 – Persons met during the field visits

- **Harbor Managers**

Mr. P. Hettiarachchi – Puranawella
Mr Isuru Gunawardene – Mirissa
Mr Niroshan – Hikkaduwa

- **Fisheries Corporation**

Mr. Shelton – Assistant Fishery Director, Matara
Mr. N.H Gamage – Coordinating Officer, Fisheries Dept, Matara
Mr. Weerasooriya, Fishery Inspector, Mirissa
Mr. Ranjith Jayasinghe – Fishery Inspector, Puranawella

- **Representatives from other Government Agencies, NGOs and Associations**

Puranawella

Mrs. Vidanagama-Arachchi – Divisional Secetary, Devinuvara (Dondra)
Mr. I. Liyanagama – Assistant Divisional Secretary – Devinuvara/(Dondra)
Mr. H P G Sumanasiri, Grama Sevaka, Welegoda, Devinuwara,
Mr. S D K Palikkara – Development Officer, Dondra DS (AGA)
Mr. N H Gamage – Coordinating Officer, Fishery Ministry, Matara,
Mr. L H S Hemantha – Acting Assistant Director (Planning), Divisional Office
Mr. Ranjith Jayasinghe, Fishery Inspector
Ms. Siriya, Development officer, Tangalle Urban Council
Ms. Kamala, (- do -) Office phone
Ms. H.A.P. Somawathi, President, No 8 Grama sanwardene samithiya, Gamagodra
Ms. H.L. Padmawathi, Secrtary, - do –
Ms. K.B.Nandawathi, Treasurer, - do -
Ms. T.M. Chandraleka, President, Gandara Ekamuthu Deevara Samithiya
Ms. Swineetha Amadoru, Treasurer, - do -
Ms. M.L.Chandrika, Secretary, - do -
Ms. Dayawathi, Member, - do –

Mirissa

Mr. Sarath, Divisional Secretary – Weligama DS
Ms. Dahanayake – Asst Planning Director
Mr. Generable Sirisena – Admin Officer, Weligama DS Officer.
Mr Sham, Grama Sevaka – Mirissa South 1
Mr. Gamini, Grama Sevaka – Mirissa South 2
Ms. Priyanthika Rajapakse – Weligama UC
Mr. Pushpa Kumara – Galle UC

Hikkaduwa

Ms. Kusum Piyaratne - The Divisional Secretary, Hikkaduwa.
Mr. Manoj Krishantha – Chairman, Hikkaduwa PS (the LA)
Mr. Karunananda, Additional Divisional Secretary, Hikkaduwa
Mr. Anthony, Grama sevaka, Hikkaduwa Town
Mr. Samaradeera, Public Health Inspector, Hikkaduwa Town
Ms. Renuka Jayasinghe - District Manager, Arthacharya Foundation district office
Ms. Ruwanthi - Field coordinator, Arthacharya district office
Ms. Mallika, Development Officer, Hikkaduwa PS (trained by the TALG-USAID Project)
Ms. Neelamani – Environment officer, Hikkaduwa PS(-do -) Office
Mr. Siri Goonewardene - President, Hikkaduwa Hoteliers Association
Mr. M. V. Jayaweera (Sunil) – President of the Glass Bottom Boat Owners Association
Mr. Pial Gunarathna - President, Hikkaduwa Protection Society
Chief monk, Jananda-ramaya Temple, Hikkaduwa

Matara District Secretary Office

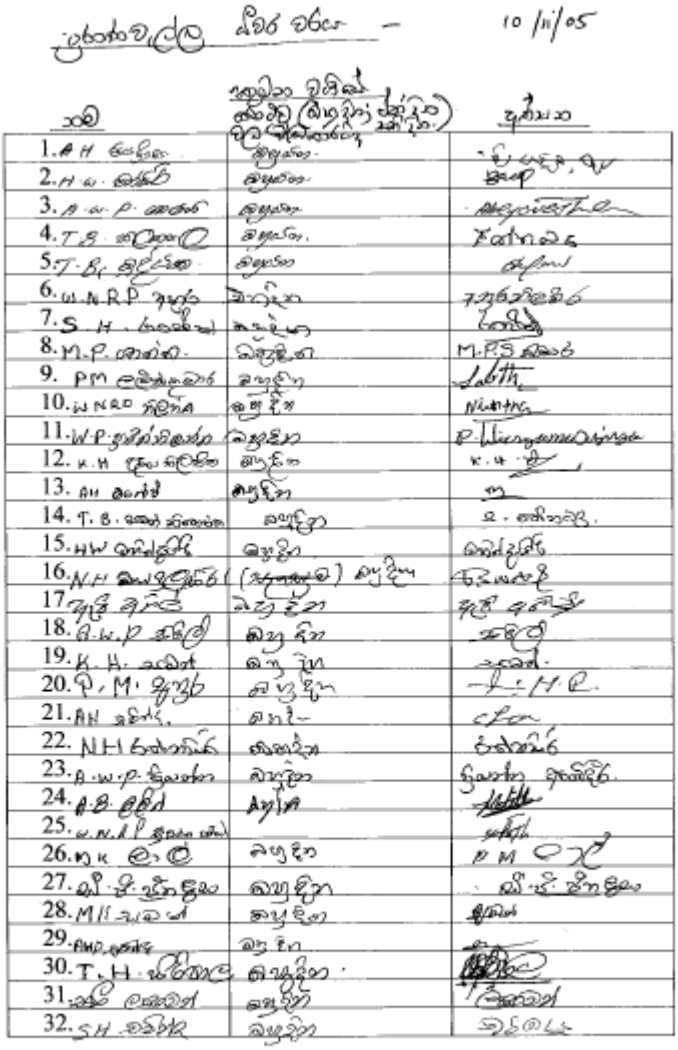
Mr. J Pathirana – Director Planning (DP)
Ms Hema – DP's Secretary
Mr. Chandima – Development Assistant
Ms. Dhammika – Assistant Director

- **USAID Transparent and Accountable Local Governance(TALG) Project, (in the field)**

Mr. Dhammika Mahendre – Program Officer

Annex 6: Attendance at the Harbor consultations

Attendance Record – Puranawella – 10th Nov 2005



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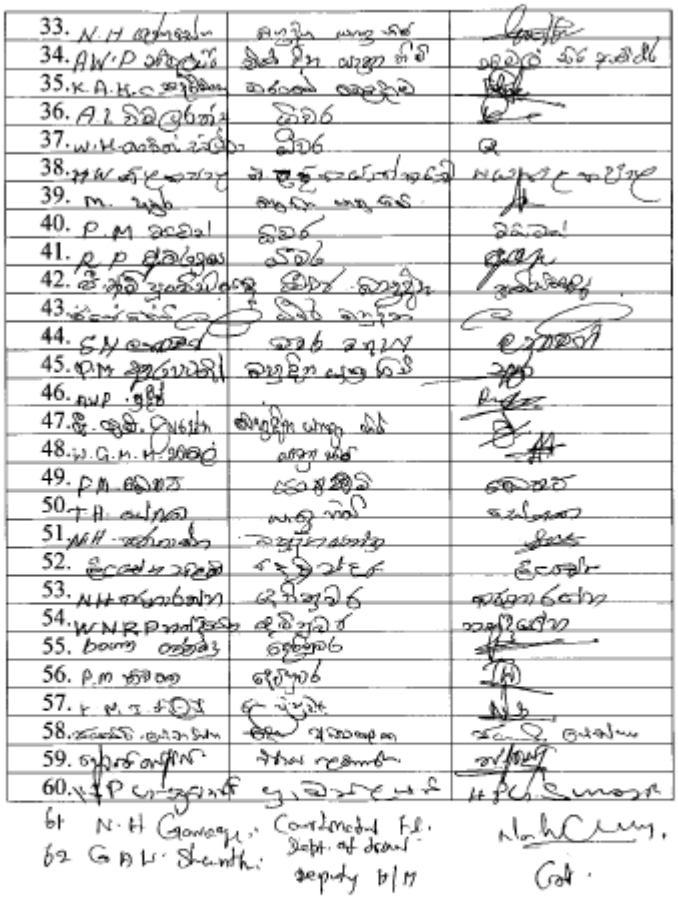
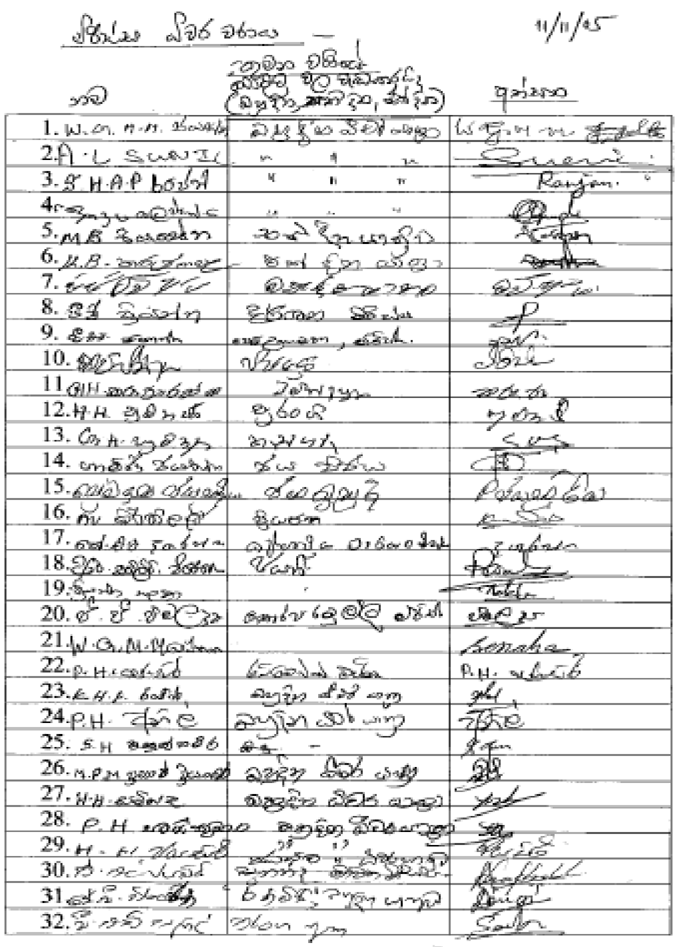
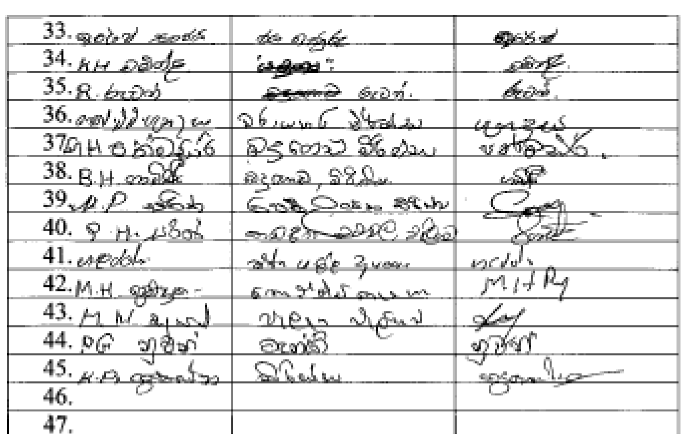
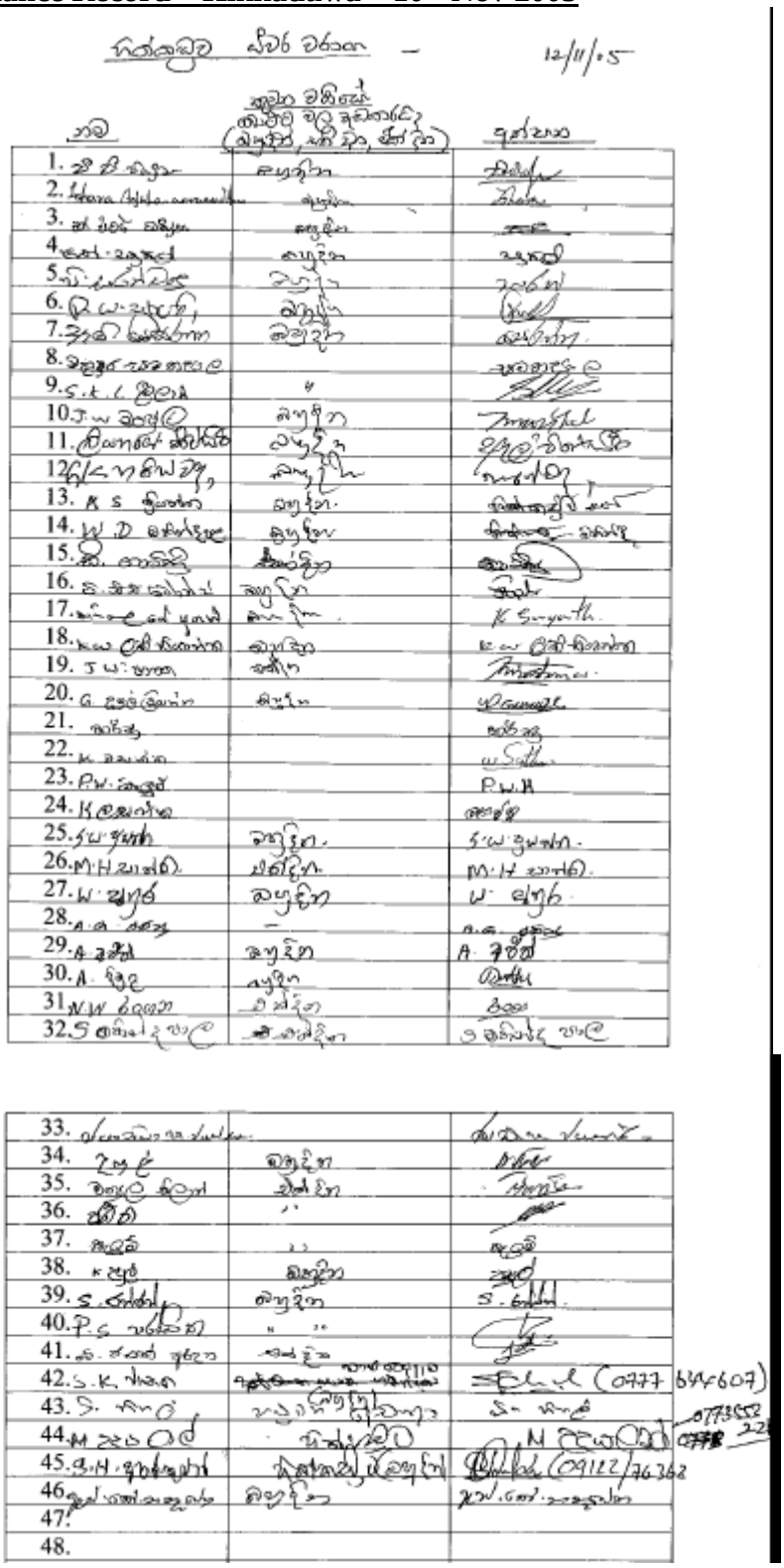


Attendance Record – Mirissa – 11th Nov 2005





Attendance Record – Hikkaduwa – 10th Nov 2005



Annex 7 – Newspaper article on team's harbor visits, 6th Dec 2005, Divaina (sinhala paper).

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